RHODESIA

REPORT OF THE SECRETARY FOR AGRICULTURE

for the period

1st October, 1969 to 30th September, 1970

Presented to Parliament of Rhodesia

1971

Price $1·05 per copy

PRINTED BY THE GOVERNMENT PRINTER, SALISBURY
1970

COMMONWEALTH MYCOLOGICAL INSTITUTE
20 MAY 1971

Cmd. R.R. 5—1971]

[G.P. & S. 45353—755.

REPORT OF THE
SECRETARY FOR AGRICULTURE

Report of the Secretary for Agriculture

for the period 1st October, 1969 to 30th September, 1970

World agricultural survey

FOR the first time in twelve years, world agricultural, fisheries and forestry production in 1969 remained static. The stagnation in production is primarily due to reduced output in the developed countries, where surpluses rather than shortages were the problem. In the developing countries production continued to grow but at a rate somewhat lower than in recent years. Fisheries output fell by 3 per cent., while forestry output increased by 2 per cent.

Agricultural production showed only a very small increase. Production in the less developed countries increased by 4 per cent., largely as a result of bigger harvests of rice, wheat, sugar and cereal grains in the Far East. In comparison, there was an overall decline of 1·5 per cent. in production from the developed countries, notably in the U.S.S.R., Eastern Europe, Western Europe, and Australia. Most of this decline was brought about by a 9 per cent. reduction in the wheat crop, though potatoes, sugar beets, rye, oats and rice experienced smaller harvests. Maize and barley crops in the developed countries were larger. Poultry meat and eggs accounted for most of the gain in the output of livestock products in the developed countries.

Compared with 1968, weather conditions for 1969 were more favourable in Canada, most of South and East Asia, South-Eastern Europe and West Africa. On the other hand, unfavourable weather affected production in the U.S.S.R. and Australia. Weather conditions in Western Europe were not bad but did not match up to the good conditions in 1968. Southern Africa experienced drought conditions.

World grain production again increased in 1969, though there was a noticeable shift in emphasis from bread grains to feed grains. Wheat production fell by 5 per cent. from the record 1968 output, reductions taking place in the United States, Western Europe, the U.S.S.R. and Australia. Maize production was 1 per cent. higher than the previous record crop of 1967. United States production was up slightly. Drought conditions reduced the Mexican crop with the result that overall maize production in North America remained unchanged from 1968. Both Western Europe and Eastern Europe produced record maize crops, large increases occurring in Italy, Hungary and Yugoslavia. In the Southern hemisphere both the Argentine and South Africa recorded increases in maize production.

Cotton production in 1969–70 is estimated at 51·3 m. bales, slightly down on the 1968–69 crop. Unfavourable climatic conditions brought the Mexican crop down to the lowest level in ten years. Further reductions occurred in the United States and Brazil. Nearly all countries in Africa recorded an increase in cotton production. Despite the overall decline in cotton production, world consumption of textile fibres rose by 3 per cent. Man-made fibres gained further ground from both cotton and wool and now account for 38 per cent. of world fibre production. However, the overall growth of the market has allowed for an increase in cotton production which over the 60's decade amounted to 10 per cent. Increases in cotton consumption in Asia and Africa have more than offset the declines that have taken place in Western European markets.

The world output of tobacco in 1969 held steady, though is still down on the record output in 1967. Some gains in output are recorded in the United States, Canada, Mexico and Brazil. These were offset by declines in Europe, Asia and Africa. The United States continues as the world's largest exporter of manufactured tobacco, accounting for one-third of the trade in 1969. The continuation of sanction policies against Rhodesia has placed the United States in a favoured situation to supply world requirements of tobacco, particularly in those markets which are compelled to secure substitutes to blocked Rhodesian sources.

Sugar production in 1969–70 increased by 5 per cent. over the previous year's record production level. Beet sugar production has declined but has been more than compensated by the increase in cane production. The largest increase has occurred in the Western hemisphere, which is up by 20 per cent. A major proportion of the increase came

from Cuba but their 10 m. ton target has again not been realized. Unfavourable weather conditions affected beet production in the U.S.S.R. while a severe drought in South Queensland reduced the Australian crop. The International Sugar Agreement has been in effect for two years and since its inception world prices have certainly improved, though this is probably due to world sugar production having been in balance with requirements. The sugar market is presently on a very tight rein. Upward price moves are being checked by the prospect of such rises triggering the release of additonal sugar supplies authorized under the Sugar Agreement.

The production of oil seeds is dominated by soya beans which account for 40 per cent. of production and this in turn is dominated by the United States. Most oil seeds showed an increase in 1969 over 1968 levels, the main exception being groundnuts, where reductions in output from India and Senegal had an effect on overall output. Vegetable oil and meal production is a function of oilseed production and the market opportunities for these products dictate the demand for oilseed. The vegetable oil and meal market is again affected by the output of animal oils and meals. The prices for high protein vegetable meal has tended upwards in reflection to the increased demand for livestock products produced from meal based stockfeeds. The tight supply position for fishmeal has improved the market for vegetable meals.

In response to the continued growth in world demand for red meat and meat products, world meat production continued to expand. Overall production in 1969 showed an increase of 0·6 per cent. over 1968. All regions showed an increase except for North America, Eastern Europe and the U.S.S.R. Beef and veal production increased by 1·5 per cent. over 1968 output levels, with substantial increases occurring in Asia, Africa and Australia. Pork production declined slightly from the previous year, largely due to a substantial decrease in North America. In Denmark, the world's largest pork exporter, production fell by 5 per cent. Lamb and mutton production also declined by 1·5 per cent. due to an 8 per cent. reduction in Western Europe. Production in New Zealand and Australia, the world's largest exporters of mutton and lamb, remain unchanged from 1968 levels. World meat production in 1970 will probably exceed the 1969 level but the rate of growth is likely to be down on the rate of growth earlier in the decade. World cattle numbers are slightly up in 1970 with beef cattle accounting for the greater proportion as dairy cattle numbers continue their downward trend. Beef prices on most markets were firm in the earlier part of 1969 but weakened towards the end of the year. However shortfalls in Eastern Europe have had the effect of hardening price levels in early 1970.

World milk production in 1969 is up slightly. The rate of increase in Western Europe was more modest than in earlier years. Output in Germany held steady and production in both France and the Netherlands rose by only 1 per cent. The greatest increase took place in Japan where under an incentive production programme a sharp increase of 10 per cent. occurred. The considerable reduction in the butter stocks held by the E.E.C. has lessened the pressure on world market prices in 1970. World butter production in 1969 fell by 1 per cent.; the major reduction taking place in Western Europe where there was a 4 per cent. fall. World cheese production is up by 3 per cent. over 1968.

World poultry meat production continues to increase as a result of many countries striving to achieve national self-sufficiency. This has put pressure on the exporters of poultry meat. Expansion trends are to be observed in both Western Europe and the United States and the indications are that the rate of increase will be greater than the market can absorb. This suggests that neither producers, nor the trade, can expect anything very hopeful from prices for poultry meat. Further increases are anticipated in the production of eggs.

World agricultural output for 1970 is unlikely to exceed the 1969 level. The American maize crop has been affected by a blight disease which could reduce their maize harvest by as much as 6 per cent. In the E.E.C. and in the United Kingdom the grain crop is short, with the wheat crop in the E.E.C. being down by an estimated 5 per cent. Wet, cold weather in the spring hindered sowing and a dry summer has aggravated the position. Severe floods in Eastern Europe have deflated crop prospects. In Western Asia and Australia drought conditions have been serious. Feed grain prices in the latter part of 1970 have experienced a dramatic upsurge and prices for many other agricultural commodities have held their ground. However,

world agricultural output can change dramatically from season to season. The real issue at stake in the decade of the 1970's is the policy decisions taken by the major trading nations towards international agricultural trade. A disquieting feature of international agricultural trade in the latter 60's is the trend towards protectionism. This is typified by the development of protective policies in the E.E.C. High domestic prices are maintained by a variable levy system which protects the domestic market from foreign competition. A further feature which could cause major problems for the trading world is the extension by the E.E.C. of its trade network. A series of preferential trading arrangements with Mediterranean and African countries has been built up. Twenty-two countries already have Associate status. Kenya, Tanzania and Uganda have signed preferential agreements and agreements with Spain and Israel appear imminent. Five Mediterranean countries have held exploratory talks and several major European nations are currently negotiating for entry to the Community. The discriminatory nature of these preferential arrangements will be disastrous for the unilateral trading system. The entry of the United Kingdom into the E.E.C. will again cause considerable problems, though whether this country succeeds in her membership bid or not, future trading into that market will be more difficult. The Conservative Party proposes to abolish the deficiency payment system in favour of a levy system on food imports. All these issues will have far-reaching effects throughout the world. The policy decisions made and about to be made do not appear to have resolved the conflict between the desire to trade and the desire to protect.

Seasonal conditions and effects

On the Rhodesian scene the 1969–70 season turned out to be extremely short in duration. General heavy rains occurred throughout December, followed by a prolonged dry spell in January and February. Early planted crops managed to come through, though yields were adversely affected. Late planted crops in most cases failed. Overall poor yields resulted in the volume of crop production being considerably down on the comparatively bumper harvest of the 1968–69 season. An improvement in the general level of prices did much to prevent a completely disastrous season and the value of agricultural production may well turn out to be no less than 10 per cent. of the record value of production in 1968–69. The effect of the poor season has not been so noticeable on the livestock industry, since late rains improved both veld and water supply conditions. A relatively mild winter has also assisted the industry. In consequence the volume and value of livestock production made a further considerable advance and in part helped to offset the reduction in output from the cropping side of the agricultural industry.

The decline in agricultural output arising from the adverse season will have an effect on foreign exchange earnings, though because of the substantial carry-over stocks from the 1968–69 season the effect on foreign exchange earnings will not be felt until 1971. The reduction in foreign exchange earnings from agriculture will have its impact throughout all sectors of the economy. The net farm debt position shows a further increase, even though there has been an improvement in liquidity brought about by the favourable 1969 harvest. The conclusion to be drawn is that favourable seasons do not provide sufficient returns with which to reduce the debt load. In order to overcome the debilitating load of capital redemption and interest, provision could be made in agricultural finance to provide capital at a longer term and at a rate of interest more in line with the farmer's ability to succeed in servicing interest repayments.

Government measures

Government has been fully aware of the difficulties confronting the industry and has adopted measures designed not only to improve the present farm income position but it has announced measures to improve the longer term situation. Drought relief measures were announced on 7th May, 1970. A total amount of $1·9 million was budgeted for the exercise covering relief measures for drought affected crop programmes, the transport of drought threatened livestock, a rebate scheme on borehole sinking, together with a relief programme designed to enable beef and dairy herds to be safeguarded.

The basic difference between this year's relief scheme and the 1968 relief scheme was that any drought relief claims would be restricted to those lines of production suitable to the agro-ecological environment of the particular farm. Furthermore,

instead of basing drought assessments on percentage reduction in gross farm income, assessments were based on percentage reductions in yield from the average yield over the past six years.

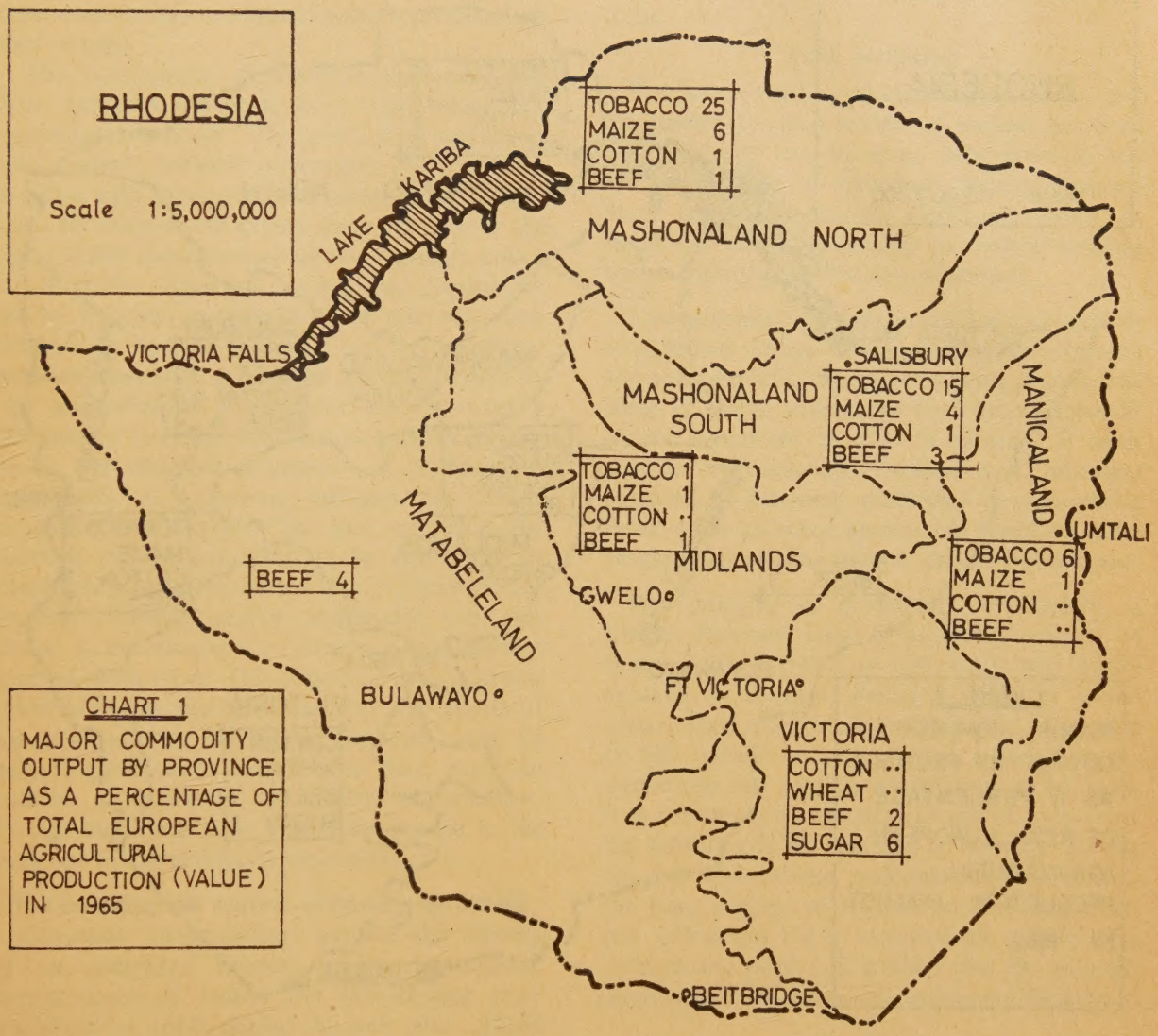
In June 1970 Government announced an increase in the 1970–71 tobacco crop target from 100 m. to 132 m. lb. Half of this increase was to boost the quotas of all tobacco growers and the remaining half was specifically to assist the small to medium grower who has been in particular need of assistance. In order to improve the longer term farm income position, an announcement was made in July 1970, guaranteeing a minimum producer price for maize and cotton for three years in advance, namely, 1970–71, 1971–72 and 1972–73. These price guarantees were related to maize and cotton deliveries not in excess of 11 m. bags of maize and 350 m. lb. of cotton. Government also agreed to accept the cotton trading loss for the 1969–70 season amounting to $0·7 m. In September it was announced that the incentive price schemes for groundnuts and soya beans would be extended for two years and three years respectively. All these measures have committed Government to substantial injections of finance which will benefit the agricultural industry and the national economy both in the short- and long-term. They should provide a new stimulus to the industry and improve the morale of an industry severely depressed by two bad drought seasons over the past three years.

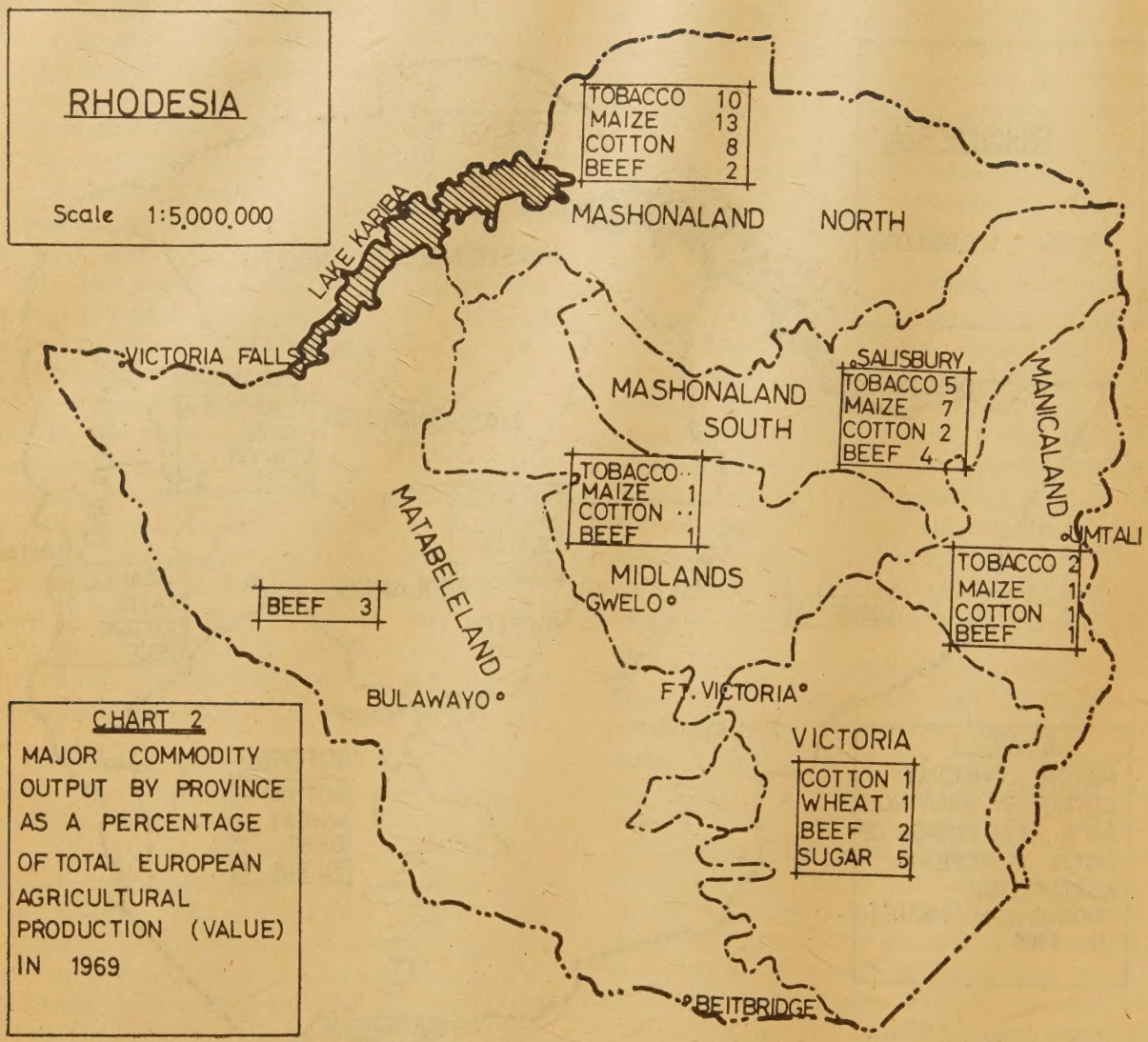
Government has also provided considerable funds for the infrastructure associated with the handling and marketing of both maize and beef. By mid-1971 a second bulk maize silo will be in operation at Banket, and a third silo should be operational in 1972 at Lions Den. Current plans envisage a fourth inland silo. The beef industry will enjoy the facilities of a modern abattoir at Gatooma which is scheduled to become operational by the end of 1970. Evidence shows that a further abattoir will have to be constructed in the present decade and plans are already in hand to accommodate such an eventuality.

Government hopes to create, by 1971, the Agricultural Finance Corporation, which will amalgamate all sources of agricultural credit provided by the public sector. Several of these sources such as the Land Bank and the Agricultural Assistance Board were created by legislation, whereas other funds such as the Farm Irrigation Fund, the Agricultural Diversification Fund and the Agricultural Loan Fund, were established administratively. The object is to control and rationalize credit which is a fundamental resource in Government efforts to rehabilitate the agricultural industry. The new Corporation will, like the Land Bank, operate in a high risk field, but whereas in the past the existence of so many sources of credit has tended to make for unsatisfactory lending and borrowing conditions because of the dispersion of relevant information, under the new Corporation both borrower and lender can be assured of a greater security in obtaining and lending agricultural finance.

Under the proposed Agricultural Finance Corporation Act, provision will be made for taking over the Farm Irrigation Fund. Since its inception in 1966 some 1 400 loans have been approved involving $5 million. The scheme has been responsible for creating over 46 000 acres of irrigation and many thousands of acres of previously unused grazings have been opened up. It is yet too early to assess the overall effect of the finance provided by this fund on the agricultural industry. There is no doubt that it has succeeded in alleviating the severity of drought conditions in many instances.

Government has announced its intention to create an Agricultural Development Authority which will plan, co-ordinate and implement agricultural development over the whole country. Part of its responsibility will be to prepare and evaluate various schemes designed to improve agriculture in a particular locality. It will act as Government's agent to administer any project such as land settlement, irrigation schemes, etc. It will be responsible for planning and developing water projects in much the same way as the Sabi-Limpopo Authority currently operates. It will in no way displace the Sabi-Limpopo Authority for its relationship will be similar to the relationship which exists between the Agricultural Marketing Authority and its various commodity boards. It is important to emphasize that the Agricultural Development Authority will not be a step towards state farming and will lead to a more balanced development of the country. It will also enable a better co-ordination to be effected between the main agricultural sectors such as marketing, research, credit, education and development.


RHODESIA
Scale 1:5,000,000
LAKE KARIBA
VICTORIA FALLS
TOBACCO 25
MAIZE 6
COTTON 1
BEEF 1
MASHONALAND NORTH
SALISBURY
MASHONALAND SOUTH
TOBACCO 15
MAIZE 4
COTTON 1
BEEF 3
MANICALAND
UMTALI
TOBACCO 1
MAIZE 1
COTTON ..
BEEF 1
MIDLANDS
TOBACCO 6
MAIZE 1
COTTON ..
BEEF ..
GWELO
MATABELELAND
BEEF 4
BULAWAYO
FT VICTORIA
VICTORIA
COTTON ..
WHEAT ..
BEEF 2
SUGAR 6
BEITBRIDGE
CHART 1
MAJOR COMMODITY OUTPUT BY PROVINCE AS A PERCENTAGE OF TOTAL EUROPEAN AGRICULTURAL PRODUCTION (VALUE) IN 1965


RHODESIA
Scale 1:5,000,000
TOBACCO 10
MAIZE 13
COTTON 8
BEEF 2
MASHONALAND NORTH
LAKE KARIBA
VICTORIA FALLS
SALISBURY
MASHONALAND SOUTH
TOBACCO 5
MAIZE 7
COTTON 2
BEEF 4
MANICALAND
UMTALI
TOBACCO 2
MAIZE 1
COTTON 1
BEEF 1
TOBACCO
MAIZE 1
COTTON
BEEF 1
MIDLANDS
GWELO
MATABELELAND
BEEF 3
BULAWAYO
FT. VICTORIA
VICTORIA
COTTON 1
WHEAT 1
BEEF 2
SUGAR 5
BEITBRIDGE
CHART 2
MAJOR COMMODITY OUTPUT BY PROVINCE AS A PERCENTAGE OF TOTAL EUROPEAN AGRICULTURAL PRODUCTION (VALUE) IN 1969

The changing pattern of the industry

The change in production patterns which have led to so many problems in the agricultural industry is illustrated in the two charts on pages 5 and 6 which set out the percentage value of each commodity by province in 1965 and 1969. The heavy curtailment in tobacco output in the northern provinces has resulted in increased maize and cotton output and to a much lesser extent increased beef output.

The vulnerability of one-crop economies has been painfully demonstrated to the Rhodesian agricultural industry. The political pressures on our market outlets, particularly for tobacco, together with substantial commodity price fluctuations for some of our export commodities over the years, make commonsense of the country's policy to diversify. Attempts to stabilize commodity prices through agreements have not met with noteworthy success and one can be justifiably sceptical that such agreements are the solution to the unpredictable fluctuations of the world's commodity markets. Rhodesia is unlikely to ever reach and maintain a position of producing a commodity in a volume sufficient for her to dominate the market. The best way that the markets can be controlled is by attempting to differentiate our commodities from other countries' products through quality. Associated with this factor is the necessity to guarantee a consistent level of production. This is particularly important when breaking into new markets. The efforts of the Agricultural Marketing Authority and its related commodity boards have done much to achieve a reputation for quality commodities, though this again is an aspect determined in the long run by the producers themselves.

The recording and analysis of farming operations

Economic circumstances beyond the control of the individual farmers, their representative organizations or indeed the Government have continued to apply during the past year. These conditions have obliged farmers to produce commodities which earn comparatively low profit margins per unit of production. The necessity to engage in such production has increased the complexity of individual farming systems. Both factors make great demands on the managerial ability of the farmer. It is therefore vital that he should be able to analyse his activities, in order to measure his standard of performance and particularly in order to provide himself with a realistic basis for future planning. The three year guaranteed minimum producer prices for cotton and maize should assist farmers in the preparation of future production programmes. The maintenance of business records, their analysis and the intelligent application of the results is now a basic foundation to economically sound farm management.

Land settlement

Progress towards a clearly defined policy and programme for land settlement projects has been slow. Priority has, however, been given to improving the base of agriculture through applying State land available for settlement, firstly as extensions to restore viability to existing holdings before considering it for new settlement.

New settlement can only be justified as a development project designed to achieve specific economic and non-economic objectives. As such, appropriate levels of public investment must be accepted to ensure reasonable chances of success. It must provide the individual settler with attractive prospects of becoming established on a profitable farm, while guarding against his benefiting from unearned speculative gains at the public's expense.

The principle of promoting development in African Purchase Land through the incentive of freehold title accruing to individuals who satisfy minimal requirements during a period of probationary lease often proves inapplicable. The grant of title releases many a former lessee from the restrictions and possible cancellations of his lease, thus permitting him to relax all efforts to improve the holding and his standard of farming. During the year Government reaffirmed its adherence to the basic concept of the African Purchase Area, but, unless this too is accorded the priority of a development project, it is likely that the generally unsatisfactory situation will continue to deteriorate.

The future

The prime aim of Government policy is to stabilize the agricultural industry. Agriculture has been in the past and will in the future continue to be the spearhead to the country's development. The utilization of our natural resources necessitates occupancy of the land which is conditional upon the ability to secure a satisfactory livelihood from the land. The creation of such conditions is

well within our reach. Much has, indeed, been done, but more is required if the industry is to achieve its vital role. The cost of these measures may be considerable but it is, in the long term, all sectors of the economy which benefit and not just the industry in receipt of such assistance.

A country in Rhodesia's stage of development must rely heavily on the proper utilization of its natural resources and this in turn requires that the people on the land must have the opportunity for earning reasonable livelihoods, subject always to the efficiency factor. Progress is being made but at the same time other factors are tending to restrict or counter this.

I am particularly concerned with three items. The first is a tendency for interest rates to harden. The load of the aggregate agricultural debt is heavy indeed and I do not believe the industry can stand higher interest rates. On the contrary, I hold the view that an agricultural interest rate for other than seasonal loans is not only necessary but would be an effective and probably the cheapest form of assistance. Secondly, I draw attention to the degree of inflexibility with which the industry has to contend arising from the comparative smallness of our internal market in relation to total volume of production. Agriculture is a vital and large sector of the national economy. It would be wrong to force reduction of total output—always with the qualification of reasonable efficiency. But it would be even worse to cause reduction through taking action which is too late and which is of a degree so small as to be a short-term palliative rather than a longer-term cure. My third point is that I am concerned at the large acreage of land which is owned but unoccupied. I do not believe that anybody should be in a position to sterilize or hold up the utilization of natural resources. The area involved is some 618,000 acres. This land should be contributing to the economy and if this is not being done through utilization which gives employment and adds to the internal market then I would suggest that consideration be given to getting a cash contribution.

Staff

The staffing position continues to cause concern. Turnover is too high and it is too often the best who find alternative employment. Recruiting is unsatisfactory. The result is a heavy load on staff, made heavier by increasing demands. Steps are being taken to improve the position which one hopes will be successful. The country owes a debt of gratitude to those loyal and dedicated men in its employ, and particularly so to those whose work lies in the field.

In memoriam

It is with great regret that I report the death of nine officers during the year. They are:

Mr. H. R. L. Mundy—Principal, Gwebi Agricultural College
Mr. G. E. Rowe—Provincial Conservation and Extension Officer
Mr. E. M. Plenderleith—Department of Conservation and Extension
Mr. J. M. Anderson—Department of Veterinary Services
Mr. N. A. MacCrimmon—Department of Veterinary Services
Mr. J. R. Gloss—Tsetse and Trypanosomiasis Branch
Mr. W. G. Bitmead—Tsetse and Trypanosomiasis Branch
Mr. A. F. G. Farmar—Land Settlement Branch
Mr. D. D. G. Matondo—Agricultural Economist

Each of them gave of his best at all times and served with unswerving loyalty. To their dependants we extend our very deep sympathy in their loss.

Acknowledgements

I would like to express my sincere thanks to the staff of the Ministry of Agriculture and particularly to those in the field. Agriculture is full of hazards and many of these impose additional duties on a hard-working group of men. They have never failed to give of their best with personal considerations put aside.

To our statutory marketing organizations and to producer organizations I wish to express my appreciation for their energetic and constructive approach towards a common end.

To organized commerce and industry, to other Ministries and to the Rhodesia Railways in particular, the Ministry of Agriculture willingly and gratefully acknowledges their understanding and their help.

R. A. GRIFFITH,
Secretary for Agriculture.

Economics and Markets Branch Report

for the period 1st October, 1969 to 30th September, 1970

THE increased emphasis being placed on the application of business management techniques to farming operations has resulted in an increase in the demand for advice on business management. The expansion in this side of the Branch's activities has not reduced the other activities in which the Branch is engaged and it continues to be involved in the spheres of agriculture falling under the general classification of production economics and development.

Farm management research

Whilst this section commenced the year with a complement of three professional officers and four analysts, it was soon apparent that, with the increasing interest and desire by the farming community for participation in the research work undertaken, further staff would be required to maintain the standards already achieved. More important was the necessity for the results of such research to be available as soon as possible following the conclusion of the farming year being covered. Delay in availability reduces their value. The resignation of two experienced professional officers in the section created serious problems, but the position was rectified through new appointments and staff movements within the Branch. The complement of this section has been raised to four professional officers and the number of analysts has been increased to five. Although on the surface such an increase appears a healthy sign, the loss of experience and the necessity to train the new staff created problems. In addition, by the year end the maintenance of four professional officers within the research section was creating staff problems elsewhere within the Branch. It would be regrettable, if, in the coming year, this section were to be compelled to reduce its commitments or incur delays in the preparation of data, through the inability to recruit professional staff. The data prepared by this section is proving of increasing value to individuals, the Ministry, and other interested bodies.

During the year, 85 individual farm business analyses, covering the farming year 1968–69 were completed, together with the economic assessments for these farms. For the 1969–70 farming year, some 114 farmers have indicated that they have completed the necessary recording material, whilst 156 farmers have agreed to participate in the research project for the year 1970–71. The assistance of the Farm Management Extension Service of the Department of Conservation and Extension is acknowledged in reaching these gratifying levels.

Discussion group results were completed for 21 areas and a number of reports on such matters as the viability of farm subdivisions were also prepared during the year.

Three-day farm management courses for the final year students at both Gwebi and Chibero Colleges of Agriculture were arranged and executed whilst a number of lectures were prepared and delivered at several one-day Farm Management Seminars, arranged by the R.N.F.U. throughout the country. In addition, four two-hour lectures were given to Purchase Area farmers on the subject of record keeping, with particular reference to livestock records and their analysis.

The booklet, Farm Management Data 1967–68, was printed and made available early in the year, whilst that covering the data emanating from the 85 results for the 1968–69 year, was made available as early as June, a notable achievement. In addition, booklets covering Maize and Tobacco Management Data 1966–67 were made available, whilst the booklet entitled "Physical and Financial Inputs by Operation" for maize, tobacco and cotton, was completed to the pre-printing stage.

Field surveys

Mention was made last year of the introduction of the Input/Output Survey and the disappointing response obtained. This year it was possible to concentrate more staff on this survey with good results. Unfortunately, staff resignations late in the year have again placed this survey in jeopardy. The information obtained from the co-operating farmers was analysed and an interim report on "Trends in Agricultural Profitability" was compiled which compares the profit margin obtained by 120 farmers over the years 1966–67 and 1967–68.

Field work in connexion with the survey into the cost of production of seed maize for the years

1967–68 and 1968–69, was completed and these results have been published, albeit on a limited basis. This survey which has now covered five years has been discontinued. In conjunction with officers of the Department of Conservation and Extension, the survey into the cost of seed bean production has continued.

The Central Committee of the Farm Irrigation Fund called for eighteen economic appraisals of marginal applications during the year and these were undertaken by the Branch.

Over recent years many farmers have taken advantage of Farm Irrigation Fund loans. In an attempt to follow up the effect of such development on the farms in question, and assess the actual operational costs of the scheme as against original estimates, a farm irrigation survey was instituted. A number of farmers were contacted and agreed to co-operate, but once again the loss of staff through military commitments and resignations necessitated this survey being held over for the time being. Such a situation is regretted.

In conjunction with the Ministry of Internal Affairs an investigation was undertaken into the irrigation scheme at Sachipiri and a report presented. It is expected further such surveys will be conducted. Analysis of the more detailed survey work which has taken place in Purchase Areas over a number of years was completed, and a report on the results has now been published, titled, "An Analysis of Some African Purchase Area Farms' Physical and Financial Records, 1964–65 and 1965–66." Regrettably, the African economist who undertook all the field work and most of the analysis, Mr. D. Matondo, died in January, and the finalization of the results and the report was undertaken by his successor, Mr. M. Paraiwa, not an easy task but one successfully concluded.

General

In addition to the considerable field work activities, officers of the Branch were called upon to assist in many activities related not only to the spheres of agricultural development, but to other sectors closely allied to agriculture or on whose services agriculture, amongst others, is dependent. Problems related to the transport of agricultural commodities is a typical example of such activities.

The Branch continues to provide representatives to Working Parties, inter-Ministry negotiations, consultations, advisory and planning committees; it advises other Government departments, statutory, public and private bodies on economic matters affecting the agricultural industry; it participates in international trade aspects of the agricultural industry; it investigates new projects and assesses such projects in relation to the agricultural sector; it is responsible for import control; advises on pricing policies and undertakes certain educational functions. The publication of the Market Report, which is now issued bi-annually, continued to be prepared by the Branch.

In undertaking these activities and indeed others, close liaison exists with other Departments of the Ministry, the Agricultural Marketing Authority, other Ministries, Statutory organizations and many other organizations in the public sector.

Staff

By early 1970, the Branch had, for the first time in recent years, a full establishment of professional officers. Whilst a great deal of expertise had been lost through resignations there was every indication a more stable staff position was materializing and experience could once again be built up. However, in April a resignation took place and this appeared to be the precursor for others; one in May and one in June. In September, two resignations were accepted to be effective from the end of October, so at the year end the Branch was faced with five vacancies for professional officers. This unfortunate position necessitated a reappraisal of the Branch's services with a view to trimming its operations. In addition, there was the possibility that a further vacancy could arise through the transfer of the Chief Agricultural Economist to Under-Secretary, Economics and Marketing.

On the credit side, the establishment for analysts was increased by one post and this was immediately filled. In addition, the upgrading of the post of the senior farm management economist was accepted, so giving the Branch an establishment of three senior economist posts.

Mention was made earlier of the death of Mr. D. Matondo, and here I would like to make mention of the fine way in which this officer undertook his duties within the African areas during his service with the Branch.

Apart from the appointment of Mr. Paraiwa in April, it was not possible to recruit further professional officers to fill any of the five vacancies

arising since that date. Nevertheless, conditional upon the successful completion of their degree courses, two bursary students should be available to the Branch early in 1971.

The loss of staff to the degree mentioned resulted once again in an increasing burden being placed on those remaining both professional and administrative. They responded most satisfactorily to the situation and this attitude was most appreciated.

Lastly I would like to make mention of the university students, four of whom were again employed in a temporary capacity over the long Christmas vacation. The assistance given by these students was most valuable in maintaining a flow of information from the Farm Management Research Section.

Acknowledgements

To the numerous members of the farming community with whom officials of the Branch come in contact, officials within Government, farming and statutory organizations and the public, grateful acknowledgement is made for the willing co-operation, assistance and hospitality received.

I. J. DOUGLAS,
Chief Agricultural Economist.

Land Settlement Branch Report

for the period 1st October, 1969 to 30th September, 1970

THE Branch was created on 1st July, 1969.

The Rural Land Board remained in existence for the ensuing six months, recommending on land settlement matters to the Ministry of Agriculture and on other matters such as agricultural subdivision applications and rural trading sites to the Ministry of Lands.

The Agricultural Land Settlement Act, No. 59 of 1969, was brought into effect on 1st January, 1970, and the Agricultural Land Settlement Board consisting of six members was appointed from the same date. The first chairman of the Board, now Senator W. R. Whaley, resigned in June, 1970 on accepting nomination for election to the Senate. Mr. C. A. Heurtley succeeded him as Chairman. With one consequential appointment and an earlier change due to the resignation of one member, the Board, after a period of familiarization with the nature and scope of the problems to be resolved, settled down to recommending on basic policy and positive guidelines for its implementation. These had still not been finalized by the end of this reporting year, although considerable and quite rapid progress was then being made.

Until 31st December, 1969, the physical administration of issuing, renewing or cancelling land settlement leases remained with the Ministry of Lands, who acted on the decisions taken by the Ministry of Agriculture. When the Agricultural Land Settlement Act was brought into effect, action on these decisions became the responsibility of this Branch.

Initially the Branch was hampered by the inadequacy and unsuitability of the office accommodation it occupied on split floors in Compensation House. This situation was handsomely remedied when the Branch moved to two floors in Electra House in the latter part of July, 1970. The only disadvantage is its increased detachment from the Ministry.

Administratively the Branch is now reasonably well equipped in staff and accommodation, the Board is increasingly able to deal expeditiously with matters in the light of previous experience and the crystalization of policy, and satisfactory routines have been established. It must be remembered, however, that the work of the Branch begins and ends on the land, with the farms and farmers, with the tracts of land available for use as farm extensions or new settlement units, in divisions of the African Purchase Land, all of which are scattered throughout the country.

When first created, the Branch had no field staff. Until January, 1970, the Ministry of Lands, made available six Land Inspectors to work under the direction of the Branch in order to maintain some semblance of continuity in carrying out urgent inspection requirements. An analysis of the most recent inspections of State Land leases now administered by the Branch showed that lease-holds had been inspected every four years on average, and this despite a crash programme of cursory inspections made in April to June, 1969.

Since January, 1970, the position has been partially remedied by the establishment of one post of Senior Settlement Inspector and 13 posts of Settlement Inspectors, all but three of which were filled by 30th September. This establishment remains inadequate at about the 50 per cent. level for routine inspection requirements only. Current analysis of inspectors' time over a four month period of the dry season when inspections can be undertaken most conveniently and quickly, show about one-half to be spent on inspections, one-quarter on office work, and one-quarter on other duties.

To a large extent the latter consists of local liaison with other departments and ministries in respect of roads, dips and communal water supplies in African Purchase Land, re-establishing provisional boundaries and resolving disputes on such matters as give-and-take fences, or valuation of improvements.

In the African Purchase areas much of the Branch's administrative actions in respect of leases and development is entirely dependent on the local District Commissioners. They are necessarily involved in the administration of the deceased estates of lessees, in determining heirs, in contacting and identifying individuals whose

witnessed signatures are required on documents to which revenue stamps must be affixed, and in the establishment of District Councils which are expected to assume local responsibility for the maintenance of communal facilities of roads, dips and dams provided initially by Government to promote agricultural settlement. Indebtedness to the Ministry of Internal Affairs for its considerable assistance is gratefully acknowledged.

At the local and head office level the assistance and co-operation of the Ministry of Lands is often required, and the Department of Conservation and Extension is relied upon for all technical assessments that must be made. With this dependence on the ability of other ministries and departments to respond to requests from this Branch, it will be appreciated that delays beyond my control do occur, due to the limited priority that others can afford. Nevertheless, it is not generally appreciated that the procedures that are followed in the interests of making the best decisions in respect of so emotionally sensitive a subject as land necessitate considerable periods of time. Technical investigation, local consultation, assessment of alternatives, Board recommendations, provisional decisions subject to advertising for objections, physical demarcation of boundaries, processing of applications, allocation and documentation, can seldom be done in less than a year in the simplest of cases and can take more than three years in a complex case involving several extensions and some new units. The Branch is sometimes subjected to ill-informed and unearned criticism for even inevitable delays. Occasionally, those who clamour most for something to be done, are amongst those who object to the proposed action. As all objections receive meticulous consideration, these too cause further delay.

The past year has been stimulating in the establishment of a new Branch, developing its capacity to get on with its work rather than achieving spectacular results. The following sections do not indicate the sustained efforts and high frustration tolerance to which the staff have aspired, and for which I am very grateful.

Staff

At the administrative assistant level there have been 18 incumbents of nine posts, giving an annual staff turn-over of a round 100 per cent. The effect of this on the five senior posts of three administrative officers, one assistant secretary and my own needs no elaboration in the context of what appears to be a general civil service situation.

In five registry posts the turnover has been only 60 per cent.

In the settlement inspectorate it is a pleasure to report recruitment only. Five posts were filled from January, 1970 by applicants transferring from the Ministry of Lands Inspectorate. A sixth was recruited in April specifically for work in the provisional demarcation of boundaries, of which there is several years' backlog and which cannot be undertaken on a stop-start basis in conjunction with other duties. Thirty-nine miles of boundaries were cut. A senior settlement inspector was appointed in June. A further seven inspector posts were created in July, four of which were filled by 30th September, 1970.

With 5 241 African Purchase Land and 574 European lessees, and the lack of recent routine reports on most of these files, the demand for priority inspections in connexion with lease renewals and applications for title has reduced routine inspections even further. The existing establishment will permit of an average frequency of routine inspections every 26 months, which may be improved upon as staff gain experience. Nevertheless, the position will remain unsatisfactory to both the farmers and the Branch until sufficient staff can be provided.

Land administration

Only two European holdings and six African Purchase Land holdings were allocated during the year. In the European area new settlement was reduced by a policy decision taken in June, 1970 that available State Land should first be considered for use as extensions to restore viability where necessary to adjacent existing holdings. In the African area allocations were limited by the number of applicants considered suitably qualified to take up commercial farming, despite there being 158 applicants of whom 28 were interviewed by the Board.

The allocation of extensions to enhance viability of existing farms numbered 24 in the European area and 10 in divisions of the African Purchase Land.

Solution of the major problems in the latter category can probably only be achieved by a concerted effort of several departments and ministries on a division-by-division basis. The negligible progress made in relation to a further 433 allocations already planned is held up by squatter occupation of the areas, finance, staff and administrative difficulties.

Lease administration

The statistics for the period January to September, 1970 inclusive are as follows:

	European	*African*	Total
New leases finalized	15	11	26
Renewals with the option to purchase	85	725	810
Renewals without the option to purchase	4	402	406
Cessions	7	22	29
Successions	—	56	56
Cancellations including relinquishments	2	30	32
Sub-leases to companies	3	—	3
Grants of Title authorized	49	330	379

Initial development of settlement areas

Infrastructural development of an area prior to new settlement is essential up to a minimum standard. In both European and African Purchase Land categories public roads must permit of access to the farms for settlement and administrative purposes. Initial development in African areas also includes communal water supplies and cattle dips to enable a start to be made by those with less capital and smaller units than European settlers.

Whereas in European areas the new settlers accept at an early stage a local responsibility for the maintenance and further development of their community's requirements, this pattern in the African area has emerged very slowly. It has been actively promoted only since the adoption of the community development policy in the provisions for the establishment of district councils, or wards of African councils, in divisions of African Purchase Land. Continued maintenance at the direct expense of central government, long past the initial settlement stage has fostered the illusion that this responsibility is accepted for all time.

Despite negligible new settlement, the Branch disbursed $187 000 during the 1969–70 financial year on the provision and maintenance of infrastructure in African Purchase Land. It is planned to spend a further $244 000 in 1970–71, and probably a similar amount in the following year, to fulfil most of central Government's obligations administered by this Branch.

Financial schemes

Coffee scheme

Total advances to six settlers at 30th September, 1970 amount to $206 322 with final loans of $3 040 due in December, 1970.

The first coffee was sold in 1968, and in one case the settler declined further credit on account of his sales exceeding his expectations. For all six the prospects appear good, but the final proof of the success of the scheme depends on the repayment of loans due from January, 1972.

Wengi Proving Unit

The unit operates on a trading account basis and has now completed its fourth season. It is hoped that during its fifth season 1970–71 the liquidity position, which is under monthly scrutiny, will permit of capital redemption to begin.

The original objective of proving the viability of settlement units under the 1964 proposals for a Wengi Irrigation Project has fallen away with the abandonment, on local farmers' representations, of new settlement.

It should therefore be anticipated that the proving unit concept having disappeared, direct government control for this purpose may be terminated within a few more seasons. It has also been decided that any future projects of a similar nature should be under the control of the Department of Conservation and Extension, who have been most active on the Management Committee of this unit.

Tenant farming scheme

Under this scheme applicants leasing acceptable holdings of private land may be assisted with a government guarantee for limited amounts of credit advanced by the Land and Agricultural Bank.

At its inaugural meeting the Agricultural Land Settlement Board drew attention to the fact that neither it nor the Branch serving it, were equipped to administer credit effectively. The scheme was

therefore suspended with the role previously assumed by the Rural Land Board falling to a committee of officials in respect of only those participants who wished to continue in the scheme in 1970–71.

Fifty-seven applications were received from amongst the 59 persons qualified through participation during the 1969–70 season. Of these 16 were rejected and 10 were withdrawn.

Thus 31 farmers remain in the scheme in the 1970–71 season. The total amount of new credit guaranteed was $326 300 for seasonal finance and $17 600 for periods of up to three years.

Deferred purchase scheme

This scheme presently provides for the outright purchase by Government of a viable farm at not more than its officially estimated market value, against an option to purchase privately negotiated by an applicant qualified in terms of capital and performance during not less than three years in the Tenant Farming Scheme. A holding of State Land so acquired is then leased to the successful applicant under standard State Land Settlement lease conditions, except that annual rental is calculated at the amount required to redeem the cost of acquisition of the farm over 20 years at 7½ per cent interest.

Capital qualifications were previously set at the same level of $12 000 as were required of applicants for virgin State Land farms, despite the higher commitment for rental under the Deferred Purchase Scheme. Two poor seasons in the last three together with the general problems of profitability in the industry have resulted in difficulties for some of those who were optimistic enough to apply under the scheme.

The Ministry of Lands on whose loan votes provision is made for the acquisition of land under this scheme, effected transfer of title of the following three properties during the year:

Farm	*I.C.A.*	*Acreage*	*Price*
Lot 2 of Guma . .	Doma . . .	1 849	$31 000
R/E of Fifth Chapter	Centenary West	2 998	$39 000
Lot 1 of Frascati . .	Arcturus . .	755	$17 500
Total for three farms . .		5 602	$87 500

Contributory Purchase Scheme

This Scheme provided for an applicant contributing not less than one-fifth towards the purchase of a farm by Government being assisted to the extent of not more than $10 000 repayable interest-free over twenty years provided the applicant accepts standard State Land settlement conditions for the lease of the holding.

No applications have been received in the past year. The Scheme has been suspended and no provision of funds will be made from July, 1971.

Committees

Apart from several standing committees on which the Branch was represented, I represented the Ministry on the committee appointed by the Minister of Lands to investigate and recommend on the Matetsi area. This proved to be a time-consuming commitment throughout the year and the report has not been finalized by 30th September, 1970.

Board reports

The Report of the Rural Land Board for the year ended 31st December, 1969 was laid on the table in the House of Assembly on the 4th August, 1970. The calendar year has been retained as the reporting year of the Agricultural Land Settlement Board.

G. B. THORPE,

Under Secretary,
Agricultural Land Settlement.

Annual Report of the Director of Research and Specialist Services

for the year ended 30th September, 1970

THE 1969–70 rainy season proved to be one of the shortest ever recorded on most stations. Although the season started well with good rains in October, November and December there was very little effective rain after the end of December. On some stations dry land crops were a failure and experimental crops were only kept alive by supplementary irrigation. On Matopos Research Station even the irrigation water supplies failed in early February.

As part of the Department's 21st Anniversary celebrations a series of Open Days was held on all the main Research Stations. These were all very well attended and proved to be a great success. The Guides to the Stations, especially produced for to Open Days have now been consolidated into one publication which is available to the public.

In April 1970 the 12th Meeting of S.A.R.C.C.U.S. was held in Salisbury under the Chairmanship of the Director, Research and Specialist Services. A pre-conference tour of part of Rhodesia was well supported and proved both interesting and enjoyable for the delegates.

An ever increasing interest in agricultural crops and their management resulted in a Crop Science Symposium held in July and the subsequent formation of a Crop Science Society of Rhodesia which is affiliated to the Associated Scientific Societies of Rhodesia. The first President of this new Society is the Assistant Director, Mr. P. A. Donovan with Mr. J. W. Walsh, Chief of Agricultural Education, as Secretary.

Political pressures have resulted in the break-up of the International Red Locust Control Organization. Some African States announced their withdrawal from the organization at a conference held in Rome in December, 1969, and final dissolution arrangements were made at a Council Meeting held in Blantyre in June. Subsequently it was announced that the African States are to form their own control organization but Rhodesia, South Africa and the Portuguese territories are excluded from this.

Although the legislation establishing an Agricultural Research Council has in fact been processed through Parliament, the Council itself has not started to function. However, the Interim Research Advisory Committee has met several times and members of the Committee have visited most of the Department's Branches and Stations.

The various Research Liaison Committees all met during the year to discuss present and proposed research programmes. Non Departmental attendance was always good and the contribution made by these members extremely valuable.

In further efforts to improve and strengthen liaison between research, extension and the farmer and as a result of the success achieved in this field at Henderson Research Station the Department have appointed a Research Liaison Officer at Head Office and have established an additional Liaison post at Matopos Research Station. Also in addition to the Crop Symposium already mentioned, symposia were also held on Weed Control and Animal Nutrition at Henderson Research Station and on Dairying in Bulawayo during the 1970 Show period. These were well attended, not only by officers of this Department and the Department of Conservation and Extension, but also by the farming community and the commercial sector. In some cases representatives came up especially from South Africa for these meetings.

On the development side the Department has had a particularly active year.

The new Cotton Pest Research laboratories at Gatooma, which were funded by the Rhodesia Cotton Growers' Association, are nearing completion. Also at Gatooma, the development of a permanent aerial spraying site is progressing well. This project, which is partly funded by the R.C.G.A. and in which the Ministry of Water Development have been extremely helpful, will allow for more critical work on aerial spraying on cotton to be done.

Special rain shelters for critical crop/water relationship studies at Salisbury Research Station

have been designed and are being constructed by Mr. Bamford of Chibero Agricultural College. This effort on the part of a member of staff has resulted in the saving of thousands of dollars in foreign exchange.

The new seed chambers in Seed Services designed to handle substantial volumes of large seeds are now in commission. These chambers, in stainless steel based on an Australian design, are also Rhodesian made.

The new office and laboratory complex designed to accommodate both the Departments of Veterinary Services and Research and Specialist Services and also the staff of the Salisbury Research Station are nearly ready for occupation. When the moves take place the Branch of Biometrics will occupy the building presently used by Salisbury Research Station.

Work has also started on the New Lecture Theatre for Gwebi Agricultural College. Much of the finance required for this project has been provided by public donation with the additional funds being provided by Government. It is hoped to have the building ready for use in the latter part of 1971. The first phase of the new irrigation scheme at Gwebi is now being developed and if successful, a second phase will be developed.

Negotiations for land for a new Experimental Station at Nuanetsi continue and it is hoped that the formal lease will be signed shortly, thus allowing for the immediate development of the area on the basis of plans already approved.

In October, the 1963 Regulations governing Plant, Pests, and Diseases (Potato and Tobacco growing) were repealed, and in January Amendments to the Plant, Pests and Diseases (Importation) Regulations (Federal Government Notice No. 144, 1960) were announced.

Legislation is presently being prepared regarding the Seeds Certification Scheme and also the Pesticides Regulations under the Fertilizer, Farm Feeds, Seeds and Remedies Act.

Members of the Department paid numerous official visits to neighbouring countries and also overseas. Details of these visits are shown in Appendix I.

As usual the Department received a number of important visitors to Rhodesia and these details are shown in Appendix II of this report.

The Department is pleased to record the awards of the Ph.D. to Mr. J. D. G. Steenkamp in June; an M.Sc. to Mr. I. B. Edwards in August and a B.Sc. to Mr. R. P. Mills at the end of 1969.

During the year 16 professional officers were appointed to the Department but this was more than off-set by the 17 resignations received. The Technical officer strength showed a net gain of 10 officers with 31 resignations and 41 appointments. In the other categories of established staff there were 21 appointments and 17 resignations.

It is with deep regret that we record the death of two members of staff during the year. Mr. H. R. Mundy passed away on 18th July, 1970. Mr. Mundy joined the College Staff in 1955 and was appointed Vice-Principal on 1st July 1963, and became Principal in 1965. He served the College with distinction and a singleness of purpose, in the face of considerable personal hardship.

Mr. J. M. Anderson, a meat grader in the Branch of Animal Production, died on 6th August, 1970 as a result of a car accident. Mr. Anderson had been with the Department for eight years.

Branch of Agricultural Education

In its first full year of operation, the Branch continued to be responsible to the Directorate for the two Agricultural Colleges, Gwebi and Chibero, Esigodini Institute of Agriculture, and the Departmental three-year In-Service Training Course.

In respect of the Farmer Training Scheme, inaugurated in March, 1969, the Branch Senior Training Officer continued to act as Registrar, and Secretary/Convenor of the National Advisory Committee. The inauguration of the pilot scheme in the Marandellas area made an appreciable impact on the public but, after encountering a number of practical difficulties in its implementation by the Local Committee, is now at a stage which requires considerable reformulation of the original concepts, particularly on the part of the tutor-farmers. Accordingly, the Registrar will meet the farmers, and trainees, in the Marandellas area, and from this, it is hoped, will emerge ideas which can be implemented to further the success of the scheme. In particular, the introduction of carefully planned "Sandwich Courses" has been accepted as important to the scheme.

In-Service Training commenced a new three-year course on which a number of participants were drawn from the Tobacco Research Board.

With effect from the 1st July, 1970, the post of Research Liaison Officer at Head Office was established and filled, the officer being attached to the Branch. As a consequence, the liaison activities of the Department will now undergo significant expansion, improving the channels of communication between research, extension, the farmer and the public.

During the year, a closer working relationship was maintained with all the facets of "agricultural education" in Rhodesia and, in particular, Gloag College of Agriculture was assisted in its long term future plans, while the Chief of the Branch served on the Board of Studies in Agriculture at the University of Rhodesia. In addition Branch staff served on a number of other Committees, including the Metrication Council's sub-committee for Agricultural Technical Services.

As there was no decrease in the demand for agricultural education, the planning for additional post-school certificate training was subjected to review, and specific items were included for consideration in the projected three year development plan.

Gwebi College of Agriculture

The year has been one of marked progress in many different spheres and a considerable amount of development has taken place to meet the ever-widening scope of the course in agriculture offered by the College.

Following the sinking of a successful borehole by the Ministry of Water Development, the first 10 acres of what will eventually be a 40-acre irrigation scheme has been completed and is providing a valuable training facility which was lacking in the past.

Grass leys have been developed to cater for the needs of the Friesland herd and intensive beef production, and this has involved the re-alignment of roads, water supplies and fencing.

During the year, the capacity of the electricity reticulation system was increased and four additional transformers installed. At the same time, the Hostel and several houses were re-wired and three boreholes converted from diesel engines to electric motors.

The Ministry of Works have in addition provided the African compound with a sewerage scheme based on lagoons, and plans are in hand to connect the Hostel and staff houses into the scheme.

The swimming pool and surrounds have been completely renovated and the pool itself tiled to reduce the annual maintenance costs. The Hostel, staff houses and administration block have been renovated and redecorated during the year.

The appeal for funds for a new Lecture Hall met with considerable success and construction will commence in October 1970.

At the start of the College year there were 85 students in residence, which is the highest intake in the history of the College. Forty-three members of Course 20 sat their Final Diploma Examinations in June 1970 and all but one satisfied the examiners. Course 21 began the year with 42 students, two of whom left before the end of the year; the remaining 40 students were all accepted for entry into the second year, which is a new achievement.

The fourth In-Service Training session was held at the College during the long vacation and several Short Courses were organized for farmers.

The College Farm began the past cropping season with good early rains which were followed by excessive rains in December and then a drought. The total annual rainfall was slightly over average but due to the poor distribution, crop yields were considerably reduced and in the case of maize, only sufficient was produced to meet the College requirements.

Livestock production was satisfactory although the calf crops were reduced due to the outbreak of Rift Valley Fever in the previous year.

The establishment of the Variety Trials Testing Centre on the College has enabled us to transfer some of our agronomy research commitments to them thus making more time available for our primary function of student instruction and yet enabling us to maintain close contact with agronomy research.

There was a considerable increase in the number of visitors to the College during the year, with particularly large gatherings for Diploma Day, held on 15th October, 1969, when the Prime Minister, the Honourable Ian Smith, and Mrs. Smith were the Guests of Honour, and for our Open Day held as part of the Department of Research and Specialist Services 21st Anniversary

Celebrations. The President, Mr. C. W. Dupont, and Mrs. Dupont were the Guests of Honour at our Annual Sports Day.

The large and varied programme of student activities, tours and development was only made possible with the very generous help and co-operation we received from our farmer friends, commerce and industry, and the members of our own and other Ministries, who assisted us in many different ways, and to them all we are extremely grateful.

Chibero College of Agriculture

With 78 students in residence for the first time, 31 in their first year, 36 in their second and 11 in their third year, the College's resources for instruction were stretched to the limit. Further development of facilities however, through intensification of farming activities, has eased the situation somewhat, but with the limitation of land the number of livestock which can be carried is minimal for practice in handling.

Mr. Warwick Bailey, Chairman of the Tribal Trust Land Development Corporation, was the guest of honour at a very successful Open Day held on 19th March, 1970. The students, who gave all the talks in the field and answered questions, clearly demonstrated the ability of Chibero men both to learn and relate to others the important aspects of their training at the College.

The Hon. L. B. Smith, Minister of Internal Affairs, and Mrs. Smith were guests of honour at the Seventh Diploma Day held on Wednesday, 29th July, 1970, when nine students were awarded the College Diploma. Mr. V. M. Musingwini of Course 7, was the best all round student of the year.

On the recreational side two cups, one for inter-year soccer and one for basketball were generously donated to the College and they were competed for with intense but sporting rivalry.

The selection of future students remains a matter for concern, not from shortage of applicants, but in relation to the search for standards whereby the highly valued places at the College can be equitably awarded. The screening process was further developed when 33 short list candidates were invited to the College for one week, and set a wide array of tests and interviews to measure personality, intellect and a definite interest in Agriculture. The final selection of 20 students from this short-list was made with a fair degree of confidence by all the staff participating, but the success or failure of the exercise will not be known for three years when the selected candidates sit their final examinations. The first selection proceedings for Course 11 were held at the major centres, Salisbury, Bulawayo, Fort Victoria and Umtali, in August 1970, with 421 applicants sitting the interest test.

In common with most of Rhodesia the College felt the effects of drought, but through full use being made of the early rains in October 1969, excellent crops of maize, cotton, burley tobacco and ration beans were produced. The yields per hectare were maize 6 165 kg, cotton and burley tobacco 2 250 kg and ration beans 1 800 kg.

Maintenance of both buildings and equipment, as well as construction work formed an important part of the Engineering Section's programme. Modification of original buildings, to meet new demands has become a regular occurrence with the growth of the College and this year a brooder house was converted into 14 individual calf pens whilst two pens were added to the existing bull house. A compressor was built in the workshops and a compressed air reticulation system installed.

Grateful acknowledgement is made for the support and guidance of the College Advisory Council under the Chairmanship of Senator Dr. B. S. Ellis, for the willing help given by visiting lecturers and external examiners, to the many farmers who welcome visits from the students and to the many generous sponsors, both here and abroad, who assist the college or through Scholarships aid the students financially.

Esigodini Agricultural Institute

The season's rainfall was eight inches below average. A very good start at the beginning of the season, with a 28-year record of 4·99 inches of rain in October, 1969, enabled us to commence planting on the 27th October, and all planting was completed by the 12th November, 1969. The cutting of sorghum for silage started on the 9th February, 1970, after a total rainfall on the planted crop of only 9·48 inches. Two hundred and seventy-five tons of silage was made, and the average yield per

acre was 6·1 tons. Although the season was one of the worst experienced, there was sufficient rain to produce a good grass crop.

The major development projects undertaken by the students were the construction of three improved type cottages for the Agricultural Assistants, and the completion of the dairy and beef feeding pens in light gauge tubing. The new entrance to the Administration Building and the surrounds of this block and the Dairy Block were re-designed and this new layout greatly enhances the general appearance of the Institute.

The Principal's house was completed by the Ministry of Works and was occupied at the end of December, 1969. All staff are now housed at the Institute.

Owing to the poor season it was necessary to start supplementary feeding of livestock in February, 1970 and the indications are that the supplementary feeding will continue well into November, 1970. This has therefore, entailed nine months of winter feeding. In spite of the poor season, weaner weights of calves and lambs have increased.

The orchard has been extended and now consists of 53 citrus and 46 deciduous trees. A small crop will be harvested from the three year old citrus trees this coming year. Of the 10 acres of maize planted under supplementary irrigation, only six acres of SR 52 was harvested as grain, giving an average yield of 28 bags per acre.

The second year of our course commenced with 18 second year (Course 1) and 18 first year (Course 2) students. During the course of the year, one second year student was sent down and two first year students left on their own accord. All the remaining students satisfied the examiners and will continue with their course. Two second year students during their free time in the long vacation, completely stripped a small car engine, fitted new rings, bearings etc., and when re-assembled, it worked and is still running, thus mastering that portion of their instruction dealing with engines.

The Open Day on the 29th January, 1970 was well attended and one gained the impression that the visitors were interested and impressed with what they saw at the Institute.

Branch of Animal Production

The past year has been another difficult one for agriculture, and for the fifth time in the past six years drought relief measures had to be introduced.

To qualify for assistance, it was stipulated that after many years of extension work and exhortion, the farming systems and practices of applicants had to be in harmony with their agro-ecological environments.

Beef producers were paid 90c maintenance per head on breeding stock provided their farms were not overstocked. All other types of livestock in the high rainfall areas were subsidized at 48c per bag of grain which had to be bought for maintenance purposes.

In the low rainfall areas dairy farmers were paid on average approximately 1/10c extra per gallon of milk delivered to the Dairy Marketing Board or to registered retailers. Cream producers were compensated at double the milk rates per lb. of butterfat delivered to creameries.

However sound measures as these may be in theory, it cannot be ignored that with the wide differences which do exist in the agricultural potential of the different ecological areas it is not impossible that many farmers may have been forced into mal-farming practices as a result of the Government's uniform pricing policies.

To ensure that our farming policies are based on sound lines, increasingly more emphasis is being placed particularly in livestock research on the economics of different systems of production in the different ecological areas.

The beef industry

During the period under review, the number of cattle owned by Europeans and Africans increased respectively from 2 034 746 and 2 218 246 in 1968 to 2 268 877 and 2 482 469 head at the end of 1969.

As planned, the Cold Storage Commission's abattoir at Gatooma was completed during the course of the year and they started to accept cattle for slaughter in August. Two very well equipped private abattoirs were opened at Marandellas and Fort Victoria. Grading facilities have been instituted at all these abattoirs. The slaughter statistics show that the total number of cows offered for slaughter in the prescribed areas

increased by about 30 per cent. It is evident that farmers are still stocking up and very substantial increases may be expected in cattle numbers over the next few years.

There is much speculation as regards the carrying capacity of the country but it is doubtful whether this will eventually prove to be much in excess of 5 to 5½ mature beasts. In fact, large tracts of land are already heavily overstocked and positive steps will have to be taken to prevent the cattle population being reduced in years of drought to its present numbers; particularly when it is considered that there is no more unstocked land to which drought stricken cattle can be moved as in the past.

Beef production research

Matopos Research Station

Because of the limited possibilities of raising the level of stock nutrition in the predominantly pastoral areas large scale breeding trials are in progress at the Matopos Research Station to determine how best and to what extent beef production can be increased through selection under these rather difficult conditions of nutrition.

The calving records obtained to date show that of a total of 1 014 matings of cows which were fed in winter, 66·5 per cent. of the calves born were from cows which had calved the previous year. Thirteen point five per cent. of the cows which had a calf the previous year did not reconceive and 2·5 per cent. were barren in both years.

In the groups which were dependent on veld only a total of 1 022 cows were mated. The corresponding calving percentages were 39·9, 28·3, 27·6 and 4·2.

The data further show that the progeny of cows which receive supplements in winter can be expected to grow satisfactorily the following winter after weaning when fed an average ·31 kg digestible protein and ·74 kg of total digestible nutrients per head per day. Steers so treated are now, after 15 years of selection, reaching slaughter weight off the veld at 30 months of age without a final fattening period.

With the high cost of stock feeds farmers in these areas are finding it difficult, if not impossible, to implement these systems of management.

In this connexion the experiments which were started a few years ago to determine whether the amount of food required to maintain these high levels of production cannot be reduced by weaning calves early, are beginning to show that it costs nearly as much to maintain an early weaned calf as a nursing cow.

Henderson Research Station

The work concerning the factors influencing the quality of meat in livestock was continued at the Henderson Research Station. So far, sheep, calves and beef steers have been processed through the laboratory and pigs may be included in these experiments during the ensuing year.

Makoholi Experiment Station

The value of bone meal as a veld supplement was again demonstrated during the year. Heifers which had received bone meal since weaning showed a continuing superiority, as far as milk production was concerned, compared with heifers which received no supplement. Furthermore, bone meal supplemented animals gave a 20 per cent. improvement over controls in weaner production, both in terms of numbers and weight of weaners.

Tjolotjo Experiment Station

The development and assessment of the Nkoni cattle at Tjolotjo Experiment Station continues satisfactorily despite poor seasons. The average calving rate of the 179 cows bulled was 87 per cent. with a mean weaning weight of 395 lb. for these calves. Off the veld Nkoni bullocks slaughtered at 3½ years old had an average cold dressed weight of 665 lb. with a 51 per cent. dressing percentage.

Continued success at the Shows, increasing public interest in the breed and active interest and support from the Nkoni Cattle Club has resulted in the demand for breeding stock far exceeding supply. In order to try and meet at least a greater part of this demand, the cow herd is now being increased to 300.

The dairy industry

Milk production increased by 4·3 per cent. as compared with 1968–69, accounted for in the main by increases in Mashonaland and Manicaland. Intake at Salisbury Dairy increased by 7·6 per cent. and represented 49·9 per cent. of total Dairy

Marketing Board milk intake. Milk production in Matabeleland declined and was 4·1 per cent. less than in the preceding year.

Butterfat receipts from producers during the year were 12·6 per cent. less than the 1968–69 season.

Improvements in milk quality are indicated by the increase in average quality premium paid to producers. During the year under review the average premium paid was 1·5 cents per gallon as compared with 1·39 cents per gallon in the preceding year.

Sustained sales promotion activities by the Dairy Marketing Board succeeded in increasing whole milk sales by 8·6 per cent.; a noteworthy achievement. Of greater significance was the expansion which took place in the African sector where sales increases amounted to 39·4 per cent. over the corresponding period of 1968–69. The latter would appear to have had an adverse effect on Lacto sales during the early part of the year, but this loss was subsequently recovered and sales trends are now very encouraging.

Sales of other commodities such as sterilized milk, skim milk powder, butter, fresh cream, cheese and ice cream were well maintained, some showing substantial gains. Of particular interest was the very rapid expansion of yoghurt sales, particularly the fruit flavoured types.

Cheddar cheese quality was fairly well maintained and 95·8 per cent. of all cheeses graded qualified for first grade quality. Problems associated with the presence of inhibitory substances such as antibiotics were experienced during manufacture and resulted in some poor quality cheese. Milk suppliers should take every precaution to exclude milk from treated animals from bulk milk deliveries, so as to safeguard the interests of the industry.

Butter quality was maintained and 92 per cent. of all butter examined qualified for first grade quality as compared with 87 per cent. in the preceding season.

The Dairy Marketing Board were again very successful with their exhibits at the Rand Easter Show, gaining 21 prizes including two Gold Medal awards, one for skim milk powder and the other for butter. They also won the coveted Weddel Perpetual Trophy for the best quality export cheddar cheese.

Contrary to trends in recent years, average lactation yield per cow in Milk Recorded Herds, showed very little increase, being 8 043 lb. as compared with 8 034 lb. in 1968. Whilst mature cows showed a small increase on 116 lb. per lactation, heifers dropped by 253 lb. A feature of interest was a decrease in average production shown by the leading dairy herds and that the overall average production per cow was maintained on account of improvements in production standards at the poorer managed herds.

The impact of the season on high producing animals was evident from the Milking Competition results. This year the average milk production per cow for the best 15 animals in a herd was 18 579 lb. as compared with 20 357 lb. in 1968. Butterfat production, however, remained fairly stable, the figure of 1969 being 706 lb. average per lactation as compared with 704 lb. in 1968.

The winners of the Milking Competition Section A, Milk Production and Section B, Butterfat Production were L. W. H. McLean and Mount Zonga (Pvt.) Ltd., respectively.

Dairy research

Henderson Research Station has continued its basic studies of nutrition in the dairy cow and calf. In both these classes of stock there has been considerable progress and the calf nutrition results in particular are attracting considerable farmer attention.

Investigations into milk production under semi-arid, commercial conditions were continued at Matopos Research Station. From the results so far obtained it is clear that given adequate management and nutrition, climate as such is no more a limiting factor than it is in other dairying areas of the country.

The sheep industry

The number of European and African owned sheep in the country increased from 315 377 and 319 358 head in 1968 tc 362 876 and 376 953 respectively in 1969.

As predicted last year, farmers in the high rainfall areas in particular are beginning to realize that the rearing of sheep for either mutton or wool is not as profitable as they anticipated it would be.

These observations are being confirmed by experimental results and sheep numbers in these areas may be expected to drop.

Sheep research

In the field of mutton production the studies of the damaging effects of barbed grass seeds on the growth of sheep was continued at Matopos. The growth rate of sheep after weaning decreased from 90 g/day from animals which, when slaughtered, had no grass seeds in the carcase, to 20 g/day for animals that had 200 or more grass seeds per carcase. There is a direct relationship between growth rate and dressing percentage, and the corresponding dressing percentages were 45 and 41 per cent. Penetration of grass seed is less likely in animals with thick tough skins and in this connexion it has been found that the skins of Blackhead Persians weighed, on average, 29 per cent. more than those of grade Dorpers when both breeds were slaughtered at the same body weight Although Blackhead Persians had many seeds in their coats, there were none in the carcase. Thus it seems likely that the grass seed problem might be overcome by selecting for thick, tough skins.

In experiments in which carcase characteristics were determined at 32 and 64 weeks of age for animals which were either fed or not fed protein-rich supplements during the dry season highly significant relationships were found between the length carcase; cold carcase weight ratio and percentage bone ($r = -0{\cdot}88$), dressing percentage ($r = +0{\cdot}73$), depth eye muscle ($r = +0{\cdot}74$) chemical protein: chemical fat ratio ($r = +0{\cdot}83$) and the weight of the hindquarters expressed as a percentage of the weight of the whole carcase ($r = +0{\cdot}85$). Thus it seems that the length carcase : cold carcase weight ratio provides a useful indirect measure of carcase composition.

The sheep unit at the Grasslands Research Station

The sheep unit at the Grasslands Research Station has now been in operation for a year and the problems that have arisen are considerable. Lamb mortality during the year was very high (38 per cent. of lambs born) and, because weather conditions during the latter part of the season resulted in poor pasture growth, the growth rate of the surviving lambs was indifferent. Only 60 lambs (23 per cent. of those born) reached slaughter weight when weaned (at 27 weeks) and, of those, 57 graded Lamb 1 or Lamb 2.

Wool yields averaged 2·99 kg per ewe giving a return, before deductions, of 52·08 cents per kg. The balance sheet for the year ending June 30th 1970, reflected a net loss on the unit of $1 183.

Parasitological studies

Lambs, raised on high and low planes of nutrition, under worm-free conditions, were dosed with three different levels of *Haemonchus contortus* larvae. They were slaughtered at ten months of age and their empty bodies were processed for chemical determination of body constituents, while their digestion tracts were examined for the presence of nematode parasites. The initial infestation of *Haemonchus contortus*, achieved by dosing with larvae, was largely absent at slaughter and no differences in performance due to parasitism were noted.

The pig industry

Pig production showed a very substantial increase during the past year.

To curb over-production of pigs the Government withdrew price control from the pig industry in January to allow Messrs. Colcom to be more selective in the price it pays for pigs.

Pig research

Investigations on the performance of indigenous pigs continued at Chibero where experiments to examine the effects of nutritional status on reproduction in the female are in progress.

The poultry industry

The year 1969–70 has again encompassed little organizational progress for the national poultry industry, despite considerable efforts to this end by various agencies.

Despite further increases in production and consumption of both poultry meat and eggs, continued price reductions occurred, the lower margins incurred again reduced the numbers of registered producers remaining in the field.

Main efforts of the branch during the year have been: liaison with producers and the R.N.F.U. regarding marketing, both locally and in a search for exports. Attempts to streamline statistical

assessments of production. Extension effort amongst smaller European and African producers has increased and completion of extension oriented trials at Gwebi have preceded renovation of the College experimental and teaching facilities for poultry. Regulatory and Bureau of Standards proceedings have progressed during the year.

Work with the industry has again involved considerable contact with the Executive and members of the Poultry Association with a view to establishing this body as an organizational force to the industry.

Whilst not yet supported by the whole industry, the Association could eventually form a vehicle to foster co-ordination and progress for all sectors of production. It seems imperative that such a body be eventually established. Some effort has been devoted to the establishment of poultry marketing co-operatives, so far without success. Day to day coverage of poultry matters has been considerably assisted by a new appointment in June of a technical officer attached to Head Office.

This post has cleared a backlog of extension leaflet requirements and allowed extra efforts in African areas including a course for African staff from Conex and the development of a new semi-commercial poultry housing scheme.

Poultry research

Laying trials completed at Gwebi include the effects of dietary energy levels on egg production and food intake; and an assessment of groundnut aflatoxin toxicity.

Studies continued upon cottonseed meals and antibiotic additives in broiler diets.

Agencies co-operating in this work include the Branch of Chemistry, the University, the Veterinary Research Laboratory and the Blair Research Laboratory.

Branch of Biometrics

The Branch has provided advice on the planning of experiments on an even wider basis than previously, and is now involved with a large part of the Departmental research effort. The number of experiments submitted for Biometrical evaluation has increased by some 30 per cent. However, in most trials, a greater range of variables has been analysed in detail and consequently, the computer time used was twice that in the previous year. The expansion of the Departmental research programme, which has taken place in recent years, directly leads to a need for increased biometrical services and the upward trend in the work load of the Branch will continue.

The scale of the biometrical service, which can be provided, is dependent on the facilities available. The work of the Branch has demonstrated that a computer is a vital tool to the Departmental research effort, and it is now quite evident that access to a computer is already the prime factor controlling the operations of the Branch. The arrangement with the Air Rhodesia Corporation for the use of their I.C.L. 1500 Computer has continued satisfactorily, but the present system of hiring time will soon become not only impracticable, but also increasingly uneconomic. There are already projects, which demand application of a computer to realize their full potential value, but which cannot be undertaken until there is easier and direct access to a more powerful machine.

The greatest expansion of the work in this last year has been in the evaluation of cotton breeding material and agronomic trials with this crop. Greater emphasis than before has been placed on lint quality characteristics. A sampling investigation resulted in the establishment of a control system in the fibre laboratory at Gatooma Research Station, and the weekly submission, and analysis of the results has provided the research workers at Gatooma with immediate information on their various trials. The efficiency of the scheme is a direct reflection of close collaboration between the research worker and the biometrician, and demonstrates very well the benefits to be derived from planning the work from the very outset for computer processing.

There are other projects, particularly those with livestock and perennial crops, where a continuing system of processing results as they become available would be advantageous not only to the research worker but also to the Branch. Currently there is a peak load of analyses mostly concerned with annual crops, which occurs at the end of the cropping season, and although more difficult to arrange, it is hoped to introduce a system to spread this demand and give faster return of analyses to the research worker.

In addition to providing, for the first time, full analyses of last year's cotton trials in advance of

the planning of the next season's experiments, similar trials with maize, groundnuts, soya beans and with herbicides have also been analyzed in time for the new season. Perennial crop work with tea, coffee and deciduous fruit has occupied more time than before as results now become available from trials planned in earlier years. Trials with sugar cane have been analysed for the Rhodesia Sugar Association Experiment Station.

The analysis of data collected by the Department of Conservation and Extension in the Beef Recording Scheme has continued on an ever expanding scale and much time has been spent in studying the data from the long term records of the Mashona herd at Makoholi. It is hoped that the more detailed study of these records will provide guidelines to expand the analysis of beef records in commercial herds beyond the age of weaning.

After very considerable discussion on the approach, a simulation study of soil moisture conditions which can result under various hypotheses of water usage by a maize crop, is now under way. The intention is to use various models to examine the effect of climate on the maize production potential throughout the country, paying particular attention to the season length and the occurrence of drought in the various ecological areas. It is hoped that the results of the study will assist the plant breeders and give further guidance on the planning of irrigation etc. However, it could be that until further research leads to the formulation of a more definitive and accurate model for the growth of the crop, and more field results are available to check it, the results from this very extensive study will be limited in value.

Another new project, with which the Branch has become involved is in the selection of new students for Chibero Agricultural College. The great increase in the number of applicants for the relatively few vacancies has led to the introduction of an "Interest Test." Biometrical analysis of the results of a range of tests has, in the main, only confirmed the very great difficulty in designing such a questionnaire. The work is proceeding and results are being related to those achieved by the candidates in their school leaving examinations, and in a battery of standard psychometric tests.

Some work continues to be done for research workers in other organizations and in addition to those specifically mentioned earlier, projects have been analysed for the Tobacco Research Board, the Forestry Commission and various members of the Department of Conservation and Extension.

Branch of Botany and Ecology

For many years this Branch has taken advantage of every opportunity to stress the need to do something about the increasingly serious state to which most of the drier parts of the country are being reduced by overstocking and mismanagement.

It is intended that the new ecological station for the lowveld at present being developed at Nuanetsi will be able to show how degradation can be avoided and degraded areas reclaimed, but research on its own will not solve this problem—many of the answers are already known and could be applied if the will and the organization to make a concerted attack on the problem existed.

The veld

Good rains over much of the country fairly early in the growing season created favourable conditions for grass growth. Most rainfall recording stations registered above average rainfall for September, October and December, but the rainfall from then onwards was well below the mean in most areas and especially in the west of the country drought conditions prevailed.

The rainfall west of Bulawayo has been insufficient to replenish stock watering points and water supplies are reported to be critical.

Reports have been received of severe depredation by harvester termites in areas where grass production was below normal due to low rainfall. The harvester termite is an important factor in reducing forage over a great area of Rhodesia. While methods of short term control are known, study is required of the ecology of this insect, further control measures and the biological effects of control.

Veld management studies

Staff of the Branch at Grasslands Research Station undertook further botanical analyses of fixed sample areas in the veld grazing trials at Charter Estate where the Short Duration system of grazing management is being compared with the system used at Charter Estate. The trial commenced in May, 1969. No change has been

detected in the botanical composition of the veld. This is not unexpected considering the short period during which the trial has been in operation. Cattle performance data have been published by the Charter Short Duration Grazing Research Co-ordinating Committee—"Charter Estate Grazing Trial: first progress report" *Rhodesian Farmer* 41 (18): 1970 (September 25th). The report states that it is too early to draw conclusions from the records.

At Matopos Research Station investigations continue on the principles involved in the use of multipaddocks for the management of veld grazing. At Two Tree Kop only 11 inches (279 mm) of rain was recorded during 1969–70. Poor grass production was further aggravated by severe damage by harvester termites.

These conditions, following the four-year treatment burn in Experiment 67, in October, 1969, resulted in a shortage of grazing and the experiment had to be destocked even at the lightest stocking rate of one steer to 11·2 acres.

In the grazing trial at Matopos in which two twelve-paddock systems are being compared with one involving four paddocks, the weight gains per steer from April 1969 to April 1970 and the gross return per carcase were less than in 1969. The respective gains and returns for 1970 were, for the "complete graze" system, 39 kg and $77·00; for the "quick graze" system 72 kg and $95·00; and for the three-herds- to four-paddock system 99 kg and $107·00.

In a similar trial at Nyamandhlovu Experiment Station where a four-paddock-one-herd split season graze system is being compared with a sixteen-paddock-one-herd quick-graze system both systems are now stocked at the same rate, one cow and calf unit to 6 ha. Weaning weights were again similar in both systems but were much lower than in 1969; the percentage re-conception was 86 in both treatments.

A trial using goats as a means of controlling regenerating bush under Teak Forests continued at Tjolotjo with encouraging results.

The experiment to study the seasonal growth of the common sandveld grasses, *Hyparrhenia dissoluta*, *Heteropogon contortus* and *Pogonarthria squarrosa* was repeated this year. The pattern of the dry matter increment curves for each species was essentially the same as last year but yields were much lower. *Hyparrhenia dissoluta* was the species most affected by the low rainfall and its greatest yield was only one-third of that recorded in the 1969–70 season. By mid-December dead leaves were recorded on all species and the amount of green leaf-blade did not increase after this date, although the total yield increased considerably and reached a peak in March. Harvesting twice, in mid-December and mid-March, resulted in an increased yield of green leaf-blade but there was no increase in total yield. Digestion coefficients for the plant fractions are not yet available as standardization of the "in-vitro" digestion unit which has been established at Matopos is still in progress.

A cutting experiment on transplants of *Heteropogon contortus* grown in the glasshouse has shown that frequency of cutting has a greater effect on cumulative yield than height of cutting. Cutting stimulated the development of tillers, and tufts cut high developed more tillers than those cut low. Regrowth harvested four weeks after the final cut was unaffected by the earlier cutting treatments. Frequent low cutting reduced the weight of the main root mass by approximately two-thirds.

Progress is being made in the establishment of the Ecological Research Station for the lowveld at Nuanetsi. The availability of sufficient water has been confirmed and a Technical Officer from the pasture section at Matopos will move to temporary accommodation on the station to commence development.

Pasture legume introduction

The introduction and testing of pasture legumes continues at Grasslands Research Station and at Matopos Research Station.

At Grasslands where this work is more advanced, promising results are being obtained with the introduction of Stylosanthes species into secondary grassland on old fallows.

Dr. J. N. Clatworthy, Research Officer in charge of the pasture section at Grasslands Research Station studied tropical pasture-legume work in Australia for two months early in 1970. His experience there will be of great advantage in furthering pasture-legume research in this country.

Pasture seed

Sales through the Salisbury Farmers' Co-op., the official agents for the Rhodesian Pasture Seed Growers' Association, of both certified and uncertified seed amounted to:

Giant Rhodes Grass	7 163 lb.	15 792 kg
Weeping Love Grass (Ermelo strain)	34 298 lb.	75 614 kg
Katombora Rhodes Grass	11 271 lb.	24 848 kg
Sabi Panicum	777 lb.	1 713 kg
Paspalum notatum	2 041 lb.	4 499 kg
Paspalum guenoarum	3 227 lb.	7 114 kg
Desmodium discolor	23 lb.	51 kg

The total weight of seed sold (58 800 lb.) is 61 per cent. below the total sales recorded in 1967–68 (156 431 lb.). This fall in sales and production is attributable to drought and to the decline in acreage of seeded grass in rotation with tobacco.

The Herbarium and Botanic Garden

Herbarium

Over 9 000 accessions were made to the herbarium during the year. These were made up almost equally of one-third for determination from Rhodesia, one-third for determination from Zambia, Malawi and Botswana and one-third already determined from other herbaria, both African and overseas. Seventeen thousand duplicate specimens were distributed to over 40 herbaria and other botanical institutions in other parts of the world.

Progress is being made with a comprehensive check list of Rhodesian plants and as an interim measure Check Lists of the Grasses, the Leguminosae and the Woody Plants have been completed and will be published shortly.

A revision of the Rhodesian Botanical Dictionary of Vernacular and English Plant Names by H. Wild is almost ready to go to press.

Collaboration with Lisbon, Coimbra and the Royal Botanic Gardens, Kew, is proceeding well and Vol. 3, part 1, the Mimosoideae, by J. P. M. Brenan of Kew, is published. The Fern Volume is expected any day and the first volume of the Gramineae, prepared by Dr. Launert in the British Museum, is ready to go to press. Work on the Rubiaceae, Vol. 5 part 1, currently held up by the Rhodesian Plant List, should go ahead next year. Work on Vol. 4, being prepared in Lisbon, is well advanced.

National Botanic Garden

Collections of herbarium specimens and seeds and plants for the Botanic Garden were made in the forests of Malawi, the Mafinga Mts. and the N. and NW. Provinces of Zambia. Duplicates of these collections are sent to the national herbaria in the respective countries.

Though major capital development is impeded by lack of funds, good progress has been made in the development of the Botanic Garden. A Far Eastern section was started with the planting of 80 trees. Some 350 trees are planted in the indigenous section and the areas of planted lawn were increased by five acres. Because of development and the growth of the trees the garden is being appreciated more and more by the public and it is now attracting a large number of visitors.

Co-operation, extension and training

The Branch continues to co-operate closely with the Department of Conservation and Extension and with the Department of National Parks and Wild Life Management.

Lectures were given at In-Service Training Courses for Conex officers and to a number of I.C.A. and Farmers' Associations.

The Branch continued to give the course of lectures on Veld Management at Gwebi College of Agriculture and examined students on this subject.

Committees

Members of the Branch served on a number of committees including: two sub-committees of S.A.R.C.C.U.S. International Biological Programmes; Soil Balance (University of Rhodesia); Rhodesian Pasture Seed Growers' Association; Tsetse and Trypanosomiasis Control.

Branch of Chemistry and Soil Science

The steady expansion of the general analytical service has accelerated, with an increase of 16 per cent. over the total number of samples analysed in the previous year. This is most noticeable in work done for the public, which is now more than double what it was five years ago. Consequently, it is becoming increasingly difficult to pay sufficient

attention to regulatory inspections and analyses under the Fertilizers, Farm Feeds, Seeds and Remedies Act, and plans have therefore been made to enable one analyst to devote his whole time to this important aspect of the work.

The work of the recently established laboratory for analytical investigations has led to the adoption of several new methods for analysis of fertilizers in terms of the regulations, a method for pyrethrins in pyrethrum flowers, and a more precise and less time-consuming method for aflatoxin. A semi-micro kjeldahl method for nitrogen in soils and plant materials has also been introduced, which will replace the cumbersome distillation system used in the past.

In the aflatoxin laboratory the annual survey of the intake of groundnuts at depots of the Grain Marketing Board has revealed a similar level of aflatoxin contamination to that found last year, in spite of the somewhat harsher growing conditions experienced. Monitoring of other stored products such as wheat, cottonseed cake, maize, and millet has continued, but no appreciable aflatoxin contamination has so far been found.

Until his resignation in August, the biochemist continued work on the sex attractant of the maize stalk-borer moth, and some preliminary work was done on similar studies of cut worm and potato tuber moths. Work was also started on isolation of mitochondria in maize, preparatory to determination of mitochondrial activity of inbred lines, which it is hoped may provide a valuable early-screening technique for hybrid vigour in the maize breeding programme of the Department.

Assistance has again been given to the Plant Protection Branch in the determination of pesticide residues in soils and plants, using gas-liquid chromatography.

The volume of foliar analysis undertaken has more than trebled. The increase represents some expansion of the long-term plant-nutrient surveys of commercial coffee plantations and deciduous fruit orchards, but it is mainly due to greatly increased sampling of field trials at the Rhodes Inyanga and Chipinga Experiment Stations, in order to analyse the nutritional effects of treatments.

In the soil testing section the number of samples analysed for research purposes has nearly doubled, while on the advisory side last year's figures have been maintained. Requests for recommendations for wheat and tobacco have increased appreciably (15 and 40 per cent. respectively) and there was a smaller increase for maize (9 per cent.). Recommendations for test-demonstration plots in Tribal Trust Lands decreased markedly (45 per cent.), but there was a continued increase in the use of the service by African farmers.

In support of the soil advisory service, fertilizer experiments on maize, groundnuts, and potatoes were conducted on private farms in collaboration with the Off-Stations Trials Unit of the Department. Two long-term trials on coffee in the Vumba have also continued.

In the soil physics section the response of a late-maturing groundnut variety (Makulu Red) to early planting and to different irrigation regimes in the early growing season has been investigated. The effect of treatments on pegging and podding characteristics was also determined and an attempt was made to relate flowering pattern to prevailing climate. A marked response was obtained to early planting and also, at the highest yield levels, to frequent irrigation early in the season.

In collaboration with Gwebi Agricultural College a wheat irrigation trial was carried out; this included very wet treatments at different stages of growth prior to flowering.

Considerable progress has been made in the study of the quality of the Rhodesian rainfall season, and the Biometrics Branch has now reached the computer programming stage.

Work has been started on a study of the factors affecting surface crusting of certain soils. A rainfall simulator has been developed in collaboration with Chibero Agricultural College to study the effects of rainfall on the breakdown of soil aggregates. A joint project with the Department of Conservation and Extension and the Henderson Research Station has also been designed to study the effects of different management practices in a cotton-maize rotation on susceptible soils at Henderson; this will start in the 1970–71 season.

In contrast to the trend apparent in recent years, soil surveys called for this year have involved fewer but considerably larger areas. These included surveys to assess soil irrigable potential of the Musikawanhu and Ndowayo Tribal Trust Lands in the lower Sabi Valley and of an extensive

area of farming land in the Umfuli–Hartley district. At the request of the Department of National Parks and Wildlife Management the soils of a large tract in the northern part of the Wankie National Park were investigated to provide a better ecological basis for the planning of wildlife management. In addition several surveys of minor projects in Tribal Trust Lands and farming areas were undertaken to assess the suitability of the soils for irrigation.

The research programme started in 1968 to study the constitution and genesis of granite soils continues to make progress. *Ad hoc* investigations undertaken include examination of problems arising from the development of high water-tables in established irrigation schemes, which in most cases may be attributed to either failure to provide in the initial lay-out for drainage to remove excess water, or over-irrigation.

The Principal Soil Scientist served as chairman of a working party set up by the Minister for Agriculture to study problems related to irrigation drainage.

The activities of the Soil Productivity Research Laboratory at Marandellas have been mainly restricted to soil chemistry and crop nutrition studies, owing to the absence of the soil physicist on study leave and the plant physiologist post being vacant.

The long-term programme on changes in soil fertility with continuous cropping to maize has continued. The results have aroused great interest among the farming community because they show the relative importance of ploughing, return of organic matter, nitrogen and lime, and demonstrate that fertility does not decline where management is good.

To determine the minimum level of sulphur required in standard fertilizer mixtures, the sulphate balance in soils has been studied. Two sites of the field series were on deficient soils and the sulphate content proposed for future mixtures, which supplies on average approximately 22 kg s/ha (20 lb./acre), proved sufficient. There was a small carry-over of fertilizer sulphate after one season, but the general level of sulphate in the soil decreased rapidly when little or no sulphate was applied with the mixtures.

In trials with lime and various fertilizers on the poorer types of sandveld soil there was no response to lime, and zinc increased yields from 4·9 to 5·6 t/ha (22 to 25 bags/acre) at only one of three sites.

In greenhouse tests on the efficiency of zinc carriers, zincated dolomite has proved highly effective, and promising results have been obtained with zincated fertilizers.

The chemistry laboratory (Grasslands Research Station)

Some 4 000 analyses were carried out on a total of 1 800 samples. These included dry matter digestibility determinations (*in vitro* method) and crude protein determinations on pasture grasses, maize at various stages of growth and on various parts of the mature maize plant. In addition, various samples of sawdust, derived from indigenous trees, were examined to ascertain whether steam-treating under pressure increased the digestibility of the sawdust. No differences could be detected between the treated and untreated samples.

A comparative trial of the *in vivo* and *in vitro* methods of digestibility analyses was conducted but results have not yet been processed. The grain content of snap corn was found to vary in the samples tested, from 75 to 84 per cent.

Branch of crop production

The collection and testing of Rhyzobium strains for use in legume inoculants continued at Grasslands Research Station. During the year 6 700 cultures were handled and 550 were used in greenhouse tests. Another 500 cultures were used for research purposes both within and outside Rhodesia.

A total of 20 113 peat-based inoculants for soya beans, groundnuts, peas and beans and a further 3 028 agar-based inoculants for lucerne, clover, lupin, velvet beans and cowpeas were sold from the Legume Inoculant Factory.

Because the demand for soya bean inoculant was unprecedently high (about three times the amount anticipated) and because most of this was required at very short notice, it became necessary to supply some of it in a liquid form. Some 1 325 bottles (each sufficient for 3 to 4 hectares) were sold bringing total sales for the year ended June 30th, 1970, to the equivalent of 36 391 units of inoculant.

The small scale Farm Units at Henderson Research Station, despite a season of indifferent rainfall, all showed higher net profits than before. A record profit of $800 was obtained on the 60-acre mixed farm. This has been possible with the introduction of pastures on to the farm. The associated livestock have increased the annual return of animal manures to the arable lands and this practice, in addition to correction of trace element deficiencies on the sandy soils, has caused marked increases in crop yields and financial returns.

Agronomy

At Makoholi Experiment Station, dryland maize, water planted in mid-October, yielded 3 500 kg/ha compared with 630 kg/ha when planted with the rains in late November. Irrigation provided survival water for other trials but no crop received more than 460 mm (rain + irrigation) during the season. Better maize and sorghum varieties yielded in excess of 3 500 kg/ha, and groundnut varieties averaged 1 700 kg/ha. Initial trials with sunflowers and soya beans yielded 1 100 kg/ha and 1 400 kg/ha respectively. Ploughing to a 23 cm depth or deeper raised maize yields some 500 kg/ha in excess of the 2 500 kg/ha produced where 10 cm ploughing was practised. Some herbicides proved very effective in controlling weeds in groundnuts.

In variety trials of sorghum and maize grown for grain and conducted by Matopos Research Station, yields were low. However, at both Matopos and Gatooma Research Stations sorghum was more productive than maize. After several years of testing at various centres in Rhodesia none of the newly-introduced hybrids have proved to be superior to those currently recommended.

In an experiment designed to study the effects of time of planting, spacing and seeding rate on yields of NK 300A hybrid sorghum grown under supplementary irrigation, the average yield was 7 990 kg/ha; more than the average yield of a companion trial of maize.

Water applied to the soil in mid-winter again increased yields of sorghum in the following season; where 102 152 and 203 mm of water was applied, yields of sorghum grain were increased by 39, 56 and 65 per cent., respectively.

In the grain-sorghum breeding programme 700 new experimental hybrids were made and 609 hybrids, produced in the previous season, were observed in a phenology trial. Fifteen of these were selected for further testing. A backcrossing programme using Framida as the recurrent parent was started. Because of the absence of disease the screening trials for downy mildew and leaf blight were not successful.

Preliminary investigations included two pedigree selection programmes, involving the crosses Feterita, Framida and Red Swazi x Framida, and comparisons of the use of normal seeding, spaced seeding and transplanted seedlings in variety trials.

The work with irrigated crops at Grasslands Research Station was expanded during the year by increasing the number of trials on soya beans and winter wheat while the work with groundnuts was decreased.

For the third year in succession encouraging soya bean yields of between 2 700 and 3 500 kg/ha were obtained from Rhosa and some other varieties. Plant population studies have confirmed that the optimum for irrigated soya beans is similar to that recommended for dry-land crops. Under the comparatively cool conditions prevailing at Marandellas the Rhosa variety takes 135 days to mature and better yields are therefore obtained from planting in mid-November than in December.

In some trials with soya beans nodulation was poor and yields were low. In these cases a significant yield response resulted from planting or podding dressings of 70 kg N/ha. Wheat is not extensively grown in the high altitude areas of Rhodesia because of the risk of frost. Planting date trials conducted for two years indicate, however, that careful site selection and timing of planting can minimize this risk. Results show that provided the crop is grown on land where free air-drainage is possible and provided it is planted in late-May (so that anthesis occurs in mid-August, when there is less likelihood of severe frosts) good yields may be obtained.

The yields of two dry-land maize trials designed to study, among other things, the effects of compost, were lower than usual owing to the paucity of rain from mid-January onwards but these were, nevertheless, highest where the compost was used.

Agronomy Research at Henderson Research Station includes the screening of a large number of herbicides for their effectiveness in controlling some of the important weeds and also their toxicity to the economically-important crops such as maize, cotton, soya beans and groundnuts. Testing sites are located on different soil types since herbicide action is affected by this factor and also by climatic conditions.

One of the most troublesome weeds in the main maize producing areas of the country is *Rottboellia exaltata*, (Shamva grass). This is a problem weed in maize because there is no selective herbicide which kills Shamva grass without damaging the maize. A member of the staff, who was awarded the Hastings Grain Research Fellowship, last year, is studying this plant in detail. His comprehensive work so far has included observations on the weed's seed production, and longevity as well as the seed and effects of the weed on maize grain yields.

Crop production research on dryland and under irrigation at Henderson has also included varietal testing of wheat, groundnuts and soya beans for plant breeders stationed elsewhere and co-operation in a country-wide project to study growth characteristics and yields of maize in different ecological regions. The use of plant growth regulators in cotton and the effects of plant arrangement on yields of maize and cotton under optimal conditions of soil moisture and fertility have also been the subject of study.

The range of wheat variety trials in the lowveld was extended to eight and the results of these trials enabled certain varieties to be removed from the recommended list, and others to be recommended for the first time. Some varieties under test for the first time in the lowveld showed considerable promise, and their release for bulking will depend on their performance in the 1970 variety trials.

Planting date studies, done on all lowveld stations, showed for the second successive year that there was no advantage in planting late-maturing varieties early and vice versa. The direct effects of planting date emphasized the need to plant during the first three weeks of May, and indicated that yield decline from later plantings was of the order of one bag per acre per week.

A series of nitrogen trials was conducted on all three lowveld research stations using two varieties to determine whether a dwarf variety, that was immune to lodging, would respond to higher levels of nitrogen than a taller variety normally susceptible to lodging under conditions of excessive nitrogen fertility. The results from a total of 22 such trials showed that response of nitrogen was independent of variety; response curves were established for wheat following a range of preceeding crops on all three soil types.

Irrigation frequency trials were continued; results agreed very well with those obtained from similar trials in 1967 and 1968 and showed that controlled irrigation on the basis of plant development stages was both feasible and practicable, and that frequent light irrigations were not necessary, provided the amounts applied per irrigation were sufficient to sustain active growth for longer intervals.

Trials were conducted at Chiredzi and Salisbury Research Stations to investigate the reasons for the large yield differences normally recorded between lowveld and highveld grown winter wheat. The results served to explain these yield differences in terms of growth factors and grain characteristics, and indicated certain physiological factors which were responsible for suppressing yields in the lowveld.

The wheat breeding and selection programme, started in 1968, was continued at Chiredzi under the control of the wheat breeder at Salisbury Research Station.

The bulk of the cotton acreage at Chiredzi was devoted to Cotton Pest Research trials, and the agronomic research programme was confined to spacing studies, including a comparison of skip-row planting patterns, and trials to investigate amount and time of application of nitrogen. The spacing and nitrogen trials were done on all three stations, and at Sabi variety trials and breeding work were conducted on behalf of Gatooma Research Station.

In the case of the skip-row trials, no yield differences were recorded between a range of conventional and skip-row treatments, thus confirming the findings of the previous season. In other more comprehensive spacing trials done at all three lowveld sites results showed lack of significant responses to in-row spacings, and also to row spacings varying from 6 inches to 42 inches

at all sites except Sabi where a lower yield was recorded from the widest spacing. There was no indication from any of the trials of earlier maturing from close row spacings, and it took the same period of time to harvest the seed cotton in all treatments.

Nitrogen trials at Chiredzi showed linear yield response following wheat, but no response to nitrogen following a seed bean crop. Similarly at Sabi and at Chisumbanje no significant yield responses were obtained. In general, time of application of nitrogen proved important up to at least 12 weeks from planting, and the lack of any significant interactions showed that response to nitrogen was independent of time of application.

A comprehensive programme of rice trials was planned at Chiredzi under overhead irrigation, but no work was undertaken on this crop under flood irrigation.

The first planting of Blue Belle (early October) yielded well, but subsequent plantings were badly affected by rice blast disease which reached severe proportions when most of the trials were heading in February and March. The attack of rice blast was unexpected; all trials were affected to a greater or lesser extent and the disease reduced yields to a low level and increased the variability of the trials considerably. The amount and the value of information obtained from the rice programme was thus considerably reduced.

Time of planting trials did not enable an assessment to be made of the direct effects of planting date due to the effects of blast which was more severe in the late plantings. In trials that were severely affected by blast, the adverse effects of high nitrogen levels were clearly demonstrated.

Results showed the need for adequate but not excessive levels of nitrogen, and also showed that the amount of nitrogen applied was more important than its time of application.

No significant differences were recorded in spacing and seedrate studies, indicating considerable latitude in choice of row spacing and seedrate. Variety trials yielded valuable information on adaptability and disease resistance.

The programme of field trials on the groundnut crop was confined to variety testing on behalf of the Legume Breeder at Salisbury Research Station, at Chiredzi and at Chisumbanje on both early- and late-maturing strains, and in addition two dwarf varieties were compared in a trial at Chiredzi only.

Results served to show the advances made in the breeding programme, with many of the newly developed and newly introduced strains outyielding the standard commercial varieties. The main problem with groundnut production in the lowveld is related to excessive vegetative growth and poor fruit set, and it is unlikely that this will be solved by plant breeding alone. The two dwarf varieties tested proved inferior to Valencia RI.

Field trials were conducted on all three lowveld stations to study the effects on maize yields of different levels and different times of application of nitrogen. Responses to nitrogen were similar on all soil types; at Chiredzi and at Chisumbanje there were no indications of significant yield differences as far as time of application were concerned, whereas at Sabi there appeared to be a definite advantage in applying a late top-dressing at tasseling.

A spacing and population study on the basalt provided confirmation of results obtained in previous seasons on all stations, indicating an optimum spacing of 2 ft. × 1 ft. for short-season maize varieties.

Maize variety trials were conducted at Chiredzi and at Sabi to test the performance of a new range of single hybrids derived from NPP and bred specifically for lowveld conditions. Results showed the disappointing performance of SR52 at both sites and that many of the new hybrids performed well in relation to yields obtained from R200, thus indicating the general suitability of NPP selections.

In nitrogen and spacing trials on maize no significant yield differences were recorded between rows from 12 in. to 24 in. apart, and similarly in-row spacings did not differ significantly. Very marked responses were obtained to the application of 120 lb. nitrogen per acre, which increased yields by 10 and 6 bags per acre over the control yields following cotton and groundnuts respectively. Responses to levels of nitrogen in excess of 150 lb. per acre are generally small on both types and cannot be justified economically. The results of an irrigation frequency trial at Sabi confirmed results from past trials at Sabi and at Chiredzi in showing that frequent light irrigations are of no advantage and that optimum yields are obtainable with a

relatively dry regime which provides an average irrigation interval of from 3–4 weeks.

The programme of work on soya beans was restricted to a single variety trial at Chiredzi, from which excellent yields were obtained. Varieties Bragg and Clemson proved extremely promising for the second year in succession.

Test plantings were made of guar, an annual legume and seed of which contains a mucilaginous resin which is being increasingly used for industrial purposes. Yields of certain varieties were sufficiently promising to justify further research on this crop.

Cotton trials on sandveld soils did not show any significant responses to nitrogen or population due mainly to the severe moisture stress in January and February. In the trial at the higher elevation site, Trelawney, the cotton which was water planted in mid-October, yielded three times as much as cotton planted in early December.

In a nitrogen time of planting and spacing trial, planted on heavy soil at Gatooma, the yield from mid-November planting was 30 per cent. higher than that from early December planting. As the trial was fully irrigated, it must be assumed that the differences were due to end-of-season temperatures. In this trial significant increases in yield were obtained with 85–100 kg/ha of nitrogen but higher rates tended to depress yields.

Trials with ratoon cotton were continued for a second year and the ratoon cotton yielded three times as much cotton as the annual cotton. The use of chemicals to retard early growth was a failure but grazing the early regrowth with either sheep or cattle, appears to be promising. Trials on the use of Cycocel to control the growth of cotton were continued for the second year. The height of the plants was suppressed successfully but the higher rates which gave the most marked height reductions, tended to suppress yields.

A seed-dressing trial using artificial inoculation gave very interesting results. However, the level of fungus present in the soil was artificially high and some of the seed-dressings tested which did not give good control, may be successful under normal field conditions.

Crop ecology

During the year emphasis was placed on ecological studies of the maize plant. In a co-operative project two varieties were grown under optimum management at several altitudes. Growth was more rapid in the less warmer elevations but yields were depressed. Maximum yield was achieved at the intermediate elevations with moderate growth rate while the highest cool station demonstrated a slow growth rate, and a low yield. In a study of the effects of irrigation and population on maize, high yields were achieved from conventional populations well watered throughout the life of the crop. Equally high yields were also achieved from greater population of maize which was only sparingly irrigated during the relatively insensitive vegetative phase, but was well watered from just before tasseling onwards. The stressed plant appeared to be a more efficient producer of grain than the plant which was never stressed.

In collaboration with the Grain Producers' Association the time taken to physiological maturity in maize was studied under a wide range of conditions. This project demonstrated the accelerating effects of warmer conditions on maize maturity as well as the effects of poor water conditions during the maturation phase.

Progress has been achieved in the preparation of a suitable water balance model to measure season length and the incident of within-season drought from rainfall data.

Plant breeding

The season, for Salisbury Research Station was a difficult one, with irregular rainfall at planting, excessively heavy rainfall in December and low rainfall in January and February. Despite these difficulties high yields were obtained for all crops, and it may be of interest to examine why yields on the Station were high in comparison to the poor farm yields throughout the country. Probably the most important factor was the physical condition of the soil on the Station, which was so good that it enabled infiltration and retention of the heavy December rains providing a moisture reservoir for the remainder of the relatively dry season.

Maize

A new three-way hybrid (R200) was released to the Rhodesia Seed Maize Association for bulking to produce seed for commercial planting in 1970–71. This hybrid was originally released for production in the lowveld, but has performed so well in highveld trials that it is likely to be a major variety in

this area. A new system of evaluating hybrids, using regression analysis, has clarified the varietal situation throughout the country. It appears that the late maturing varieties such as SR52 and SR13 have considerably less country-wide superiority than previously thought, and that at present many areas in the highveld would be better served by earlier maturing varieties such as R200.

Preliminary investigations into optimum plant populations in various parts of the country were initiated, and initial results indicate that plant populations on farms are generally too high for stable production.

The new maize breeding shed, cold room and dryer were completed providing excellent facilities for this programme.

Wheat

The wheat breeding programme must provide varieties suitable for all parts of the country. Thus widespread varietal testing is carried out with 16 varieties grown on nine sites in Rhodesia as well as four sites in Malawi. The results show the adaptability and promise of new varieties under different environmental conditions.

To cater for both, highveld and lowveld conditions, selection and screening is being carried out at both Salisbury and Chiredzi. At Salisbury 46 new varieties are undergoing preliminary testing and breeding material in all generations from F1 to F6 is being screened. Several new crosses have been made to introduce favourable qualities from foreign material into our varieties.

At Chiredzi, the selection programme is more limited but some 40 new varieties have been selected for preliminary testing in the lowveld in 1971.

Promising material from both sites will be included in trials throughout the country in 1971.

Agronomic work has been restricted to a variety-seedrate-spacing trial being conducted at Salisbury and four Lowveld sites, and a variety x date-of-planting trial at Salisbury.

As in previous years quality evaluation of the varieties is being undertaken by the Rhodesian Milling Company.

Barley

The Barley programme is still relying heavily on foreign introductions, which are being screened under Rhodesian conditions. Forty-nine varieties are being tested for yield and 64 introductions from Angola are being bulked in the greenhouse for testing in 1971. Varieties showing promise will be tested for quality by Rhodesian Breweries.

Oats

Unfortunately Oat Seed stocks have become infected by the bacterial disease *Rseudomonas Coronafaciens* and because of this the winter variety trial had to be destroyed. Samples of seed have been subjected to heat treatment and are being grown under observation in the greenhouse. Further stocks will be imported.

Potatoes

Breeders seed of six varieties, Up-to-date, Cedara, Kurrel, Vanderplank, Montclare and Pimpernel was released to the Rhodesia Seed Potato Association for bulking by members.

The screenhouse at Rhodes Inyanga Experiment Station was completed and in February true seed from 170 crosses was planted starting a new phase in the breeding programme.

Two variety and one observation trial on varieties from the collection were harvested during the period under review.

Soya beans

The soyabean breeding programme was expanded according to plan.

Another 25 crosses were successfully made. During summer, progeny bulk plots from 87 different crosses, representing segregating material in F2, F4 and F6 were grown at Salisbury and during winter 1969, progeny bulk plots in F3 and F5 were established at Chiredzi Research Station.

About 1 150 single plant progenies selected from locally bred material and 40 new introductions were scrutinized and 20 per cent. of these were chosen to enter critical evaluation in 1970–71. Advanced variety trials with 16 varieties were carried out at nine sites.

In the lowveld a selection from "CLEMSON" showed considerable promise, and elsewhere, where draught effects were not severe, selection made from "HOOD" performed well.

Groundnuts

Selection work within variable groundnut material continued. About 400 progeny rows were examined along with a few new introductions, of which 120 were selected for bulking up and critical evaluation.

Preliminary critical trials were carried out at Salisbury and on sandveld sites in the Trelawney/Darwendale area. There were two trials including 47 early maturing selections and two including 47 late maturing selections. Advanced variety trials with 16 early maturing varieties were conducted at five sites and with 16 late maturing varieties at seven sites. Some very promising yields were obtained from large-seeded late maturing varieties under irrigation.

Two investigations to study the effects of different seed sizes and lifting times on various varieties were completed.

Cotton

Following the development of irrigation facilities for seven hectares in 1968–69, the efficiency of seed multiplication has been improved while the control of nematodes and termites improved the efficiency of critical trials conducted at Gatooma. With the help of the Branch of Biometrics the operation of the fibre laboratory was completely reorganized and resulted in much higher efficiency.

District variety trials for the middleveld areas were conducted at Panmure, Gatooma and Angwa North. Following three years of testing in District variety trials and a spinning test in 1970, it was decided to release S64/150 and 152 as Albar breeder's seed for 1970. In line with the objectives of the middleveld programme this strain shows improved lint percentage and boll weight compared to earlier releases.

Following critical trials and field tests during 1969–70 it was decided to replace Deltapine S.L. with Deltapine 16 in the lowveld. There were no differences in field or fibre varieties but from the large scale field tests Deltapine 16 had the advantages of ease of picking, and retention of cotton on the plant.

Considerable interest has been shown in the potential for the production of Long Staple Cotton in Rhodesia. Following three years of testing with Del Cerro type cottons in critical trials, it has been decided to grow a number of field scale plots in 1970–71 of Del Cerro in areas which are likely to be suitable.

Horticulture

At Henderson, research concentrated mainly upon the testing of newly-developed cultivars of several vegetable crops for local suitability. Particular attention is being paid to the production of out-of-season vegetables by means of cultural methods. Observations were also made on various deciduous fruit crops and some work has been done on the problem of delayed foliation, which seriously affects productivity. Other subsidiary crops such as pyrethrum, strawberries and others, are also under study.

At Chiredzi Research Station the objective in the fruit programme has been to build up a series of introductory screening trials involving several fruit species and incorporating a wide range of varieties from old established ones, to those most recently released. The programme was started with three variety trials on mangoes, avocadoes and Macadamis nuts, and a banana fertilizer trial planted prior to the last report. Five new fruit trials were established during 1969 and early 1970. These were variety trials with pecan nuts, litchis and grapes, a seedling observation trial on cashew nuts and an introductory trial involving 30 different species of miscellaneous sub-tropical fruits.

A foundation planting of citrus stock was established as a basis for future experimental work on this crop. Eleven rootstock and eight scion varieties were grown from seed to give nucellar seedling material which is free from the harmful virus diseases present in much old line citrus. Selections from this material will eventually be utilized in variety/rootstock combination trials.

The potential for fruit tree growth in the lowveld was demonstrated by the vigour of the avocado, mango, banana, pawpaw and grenadilla trials. Fruit yields with the latter three types were also promising. Although some fruits were set on mango and avocado trees after 18 months, it is too early for information on the fruiting potential of the long term tree fruits. The emphasis in the 1969 winter vegetable programme was on varieties and times of planting. The main trial involved five onion varieties sown at monthly intervals

from February to June, and with growth analysis being conducted during each growing cycle. The onion plant appeared very sensitive to the high temperatures of the lowveld when sown in February or June as evidence by premature bulbing and premature leaf growth cessation respectively. March to May was found to be the optimum sowing period for onions in general and this period could be extended only slightly by variety selection. Time of planting trials with eight other common vegetable types showed that both yield and quality dropped as sowing dates became later. Sowing in March was best for crops developing during the winter. There was a constant decline until June when crops were severely impaired by increasing temperatures.

A green bean variety trial indicated that several newer varieties were superior to common standard varieties, especially from a quality view point.

At the Rhodes Inyanga Experiment Station, severe hail in October caused considerable damage to leaves, shoots and fruit in all trials. Crop records are therefore of doubtful value.

In the Apple Establishment Trial D–D fumigation again gave improved extension growth but no significant differences resulted from the other main treatments. Leaf analyses were extended to cover each tree in this trial. Plans for a new rootstock trial include propagation of all material in a pretylenchus-free condition. Preliminary attempts to propagate cuttings under mist were largely unsuccessful. Hardwood cuttings of mm 106 in the open, and layering of several rootstock types into sterilized sand, gave encouraging results.

At Chipinga Experiment Station all coffee trials continued to make steady progress, though unfortunately Fusarium bark disease has appeared in the variety trial. Grading of treatment yields was carried out at the Umtali mill of the Rhodesia Coffee Growers' Co-operative Company.

Current experiments at the stations include: artificial shade trial, N/P fertilizer trial, variety trial, new management trial, dolomitic lime trial and zinc phosphate trial. The latter commenced in December, 1969.

The plans for a coffee spacing/population trial have been finalized and this will be planted out shortly.

The two trials conducted in the Vumba are a dolomitic lime trial on Greencraft Estate and a N/P fertilizer trial on Excelsior Fall Estate.

Forty-two cultivars have been imported from Oerias, Portugal for Fusarium screening by the branch of Plant Pathology and 41 cultivars have been imported from Angola which will form the nucleus of the station's collection, planted out at the station.

The station filled an important role as a source of high quality seed, large quantities being sold to farmers.

Leaf samples were taken from 64 units on various estates throughout the coffee growing districts in the third year of the project to establish criteria for a nutrient requirement service.

One and a half acres of tea have been planted out for eventual superimposition of field trials and the clonal collection was planted, including the clones: M.T. 12, M.4, 1.5, S.13, S.17, SFS.204, SFS.371.

The seed bearer garden was interplanted to provide additional rootstocks which it is intended to graft over with the three best clones in 1971.

Current off-station trials on tea, controlled from Chipinga, and in co-operation with the Tea Research Foundation in Malawi, include the following: two zinc trials and a zinc trial on seed bearers at Southdown Estate; a zinc trial, N.P.K. trial and a potash magnesium trial on Eastern Highlands.

Very significant and worthwhile results are being obtained from these trials. Grafting has continued on the old seed bearers at the Martin Forest Reserve, Melsetter, bringing up the total to six new clones.

Regular sampling of leaves and soil on all trials has continued, particularly on the zinc trials where sampling is done monthly.

Planted pastures

Pasture research on Henderson Research Station was directed mainly at selecting grass species for their ability to sustain high production under conditions of liberal applications of N and intensive grazing. This work is being done under dryland conditions and on a small scale under irrigation.

With both cattle and sheep the pastures have been shown to have very high carrying capacities in summer and live weight gains of 800 kg/hectare are possible with steers. Detailed investigations of responses in herbage yield to applied N and effects of grazing management are in progress.

Important differences between pasture grasses have been demonstrated in their growth on sandy and clay/loam soils. For this and other reasons the liaison between the pasture research work at Henderson and Grasslands Research Stations have been increased.

At Grasslands Research Station yields greater than 15 000 kg dry matter/hectare were produced in two cutting trials established last season, whereas much smaller yields were obtained from older swards receiving similar dressings of nitrogen. The Bushman Mine strain of *Ranicum coloratum* outyielded two strains of Star Grass (Cynodon pleetostaehyus), while *Panicum maximum* G.438 outyielded the Sabi cultivar of this species.

In a grazing trial Paraguay Paspalum (*P. notatum*) again produced greater liveweight gains than Ermelo Lovegrass (*Erragrostis curvula*) and Muguga Star. There was no obvious relationship between rate of gain of the grazing animals and either the quantity or the quality of the grass available to them, as determined by cutting small sample areas. Rotational grazing using an electric fence once again reduced the liveweight gain of steers grazing Ermelo Lovegrass, even when a high stocking rate was used.

Lotononis bainesii again showed its hardiness in a dry summer, but Kenya White Clover (*Trifolium semipilosum*) grew poorly, even during the early part of the season, and must be considered unsuited to this area. Stylo (*Stylosanthes guyanensis*) has persisted well in veld, under both cutting and grazing, and resulted in increased yields of dry matter and greatly increased yields of crude protein. Work has shown that this species can be simply and cheaply established in veld by broadcasting seed on the soil surface after shallow discing.

Branch of plant protection

Entomology

The use of wingless *Drosophila* as a suitable insect for the bio-assay of residues of organo-chlorine pesticides in soil was established.

Residue analysis by G.L.C. or DDT applied to maize and cabbages were undertaken and safety intervals for this pesticide were established for these crops under Rhodesian conditions.

The efficacy of four soil systemic insecticides in controlling aphids attacking potatoes is being investigated.

The length of the complete life cycle, from egg to adult, of two species of cutworm, over a range of temperatures, has been elucidated. The reaction of different instars to light is being studied and preliminary findings are that the early instars are positively photo-kinetic, feeding on foliage by day; whereas the later instars are negatively photo-kinetic and feed mostly at night, probably below ground level.

After nearly two years in the stored products infestation room maize and sorghum grain treated with fenitrothion at 10 ppm was still relatively free from a wide variety of stored products pests. Malathion, gardona and bromophos at similar rates gave similar protection for 12 months.

Surveys to find out the incidence of *Copidosoma* sp. and indigenous parasites of potato tuber moth were maintained. A new mass rearing technique for *Apantales subandeanus* was developed and releases were carried out in all the main potato growing areas.

A critical trial to investigate chemical control of termites attacking maize was completed. The trial convincingly demonstrated the efficacy of Aldrin and Dieldrin applied to the soil at planting as a practical measure to control termites.

A survey of over 50 per cent. of the registered fruit growers was completed to assess the distribution and level of infestation of Pernicious Scale, a relatively recently introduced pest of deciduous trees. The effectiveness of current control measures and the possibility of pest managements is being studied by the entomologist temporarily stationed at Rusape.

Cotton pest research

Laboratory and field screening of promising pesticides and research on application methods were continued. Field work was hampered everywhere by a lack of insect challenge and in the rain-grown cotton areas severe drought conditions rendered trials somewhat unprofitable.

Of 19 compounds tested or retested against *Diparopsis castanea*, six appeared promising.

Eighteen compounds were tested in the laboratory for acaricidal activity. Some red spider populations showed resistance to dimethoate but not to monocrotophos or binapacryl.

Four air blast sprayers were tested for efficiency of cover at different dosage rates. The plants remained small and good cover was achieved with all machines and dosage rates. Two aerial spraying trials at Shamva and Mkwasine where ultra low volume chemicals and different application rates were tested, each returned similar yields for almost all treatments, reflecting the low pest incidence.

Binapacryl and tetradifon consistently performed well in dryland acaricide trials while tetradifon and monocrotophos performed better than binapacryl on irrigated cotton.

Where endosulfan is used in order to suppress red spider mite build up, DDT could only safely replace it in *Heliothis* bollworm control, very early and very late in this season. Substitution of endosulfan with DDT, or combinations of these two compounds at any other time, led to an increase in red spider mites.

More *Heliothis* bollworm eggs were parasitized by *Trichogramme*, in plots with carbaryl and molasses than in plots receiving conventional carbaryl and DDT sprays. Carbaryl with molasses achieved a better moth-kill than endosulfan with molasses although the latter treatment gave good control of *Heliothis* larvae at low endosulfan concentrations.

Pink bollworm remained restricted to a limited area of the Middle Sabi Development Co. from where it invaded adjoining cotton fields. Diapausing larvae occurred on Hibiscus dongolensis. A laboratory culture has been established at the Sabi Valley Experiment Station.

The current pest control recommendations remain unchanged.

Nematology

Results of a trial to determine whether cotton growth and yield could be improved by fumigation for control of the root-lesion nematode *Pratylenchus brachyurus* have been encouraging.

Host trials with the burrowing nematode *Radopholus similis* are in progress, several citrus rootstocks have been exposed to high soil populations. Peaches, rose bushes, apples, grapevines and plantains have also been exposed.

Investigations into methyl bromide phytotoxicity are continuing in various parts of the country.

First results of a fumigation trial on Seville oranges for control of *Tylenchulus semipenetrans* are encouraging.

Fumigation with Dichloropropene for control of *Pratylenchus penetrans* in apples has given good results, fumigation on average producing an increase in branch length of 24 per cent.

Hot-water treatments for control of endoparasitio nematodes have been carried out on apples, nectarines, plums, Barberton Daisies and dahlias. Investigation into nematode and plant survival are in progress.

Work is being carried out to determine the host range of the more important nematode genera, other than the root-knot nematodes.

Lists are being compiled of the "Frequency of Occurrence of Plant Parasitic Nematodes in Rhodesia, Zambia and Malawi", "Associated and Frequency of Occurrence of Plant Parasitic Nematodes so far Recorded".

Plant pathology

Out of a total of 794 specimens received, 67 were new records.

Bacterial Canker of Tomato (*Corynebacterium michiganense*) is now widespread. Very few commercial growers are still unaffected.

Fusarium wilt of peas is spreading in the Umtali/Burma Valley area. Varietal screening of likely resistant varieties is being carried out.

Armillaria mellea was recorded on many occasions and appears to be becoming more widespread. There were nine new host records.

Fruit rot of peach (*Rhizopus arrhizus*), particularly Clingstone types was prevalent, and in many cases, serious. Good control was achieved by dipping in Dichloran after picking.

An increase in the activity of Cotton Bacterial Blight was evident.

Of 1 500 seedlings of 43 coffee cultivars and hybrids screened for resistance to Fusarium stilboides only six individual plants, of three cultivars have proved completely resistant. Differences in the rate of lesion development between cultivars has been observed.

Plantvax gave significantly better control of *Rhizoctonia solani* on cotton than four other systemic fungicides when applied as seed dressings in preliminary pot trials.

Nine new records of Verticillium wilt of cotton were reported. Seedling inoculation trials indicate that Rhodesian isolates of *Verticillium dahliae* are highly virulent, and that the differential response of cotton cultivars to infection is similar to that of other countries.

In pot trials as few as 10 sclerotia per gram of soil have produced relatively high proportions of infected plants, while there is little further response to inovulum levels higher than 100 sclerotia per gram. Similar results have been observed in the field.

Evidence indicates that *V. dahliae* can survive well under Rhodesian conditions. Many indigenous weeds and several crops have been shown to be hosts of the pathogen.

Fungal Deterioration of Stored Maize: species of fungi found in stored maize in Rhodesia are similar to those in other countries but the overall level of infection is low.

Histochemical tests have proved of little value in identifying leaf roll virus in potatoes.

Seed services

During the year 1969–70, seed sample intake showed a 22 per cent. increase, field inspections a 23 per cent. decrease and plant and fruit inspections a 27 per cent. increase on the corresponding figure for the previous year.

The work in the laboratory was divided into routine and research sections, but the projects assigned to the latter had to be temporarily shelved due to the acute shortage of staff combined with an appreciable increase in sample intake.

Three new cereal varieties, one Barley and two Wheats were released for multiplication. In seed potatoes the introduction of increased quantities of virus free breeders seed is progressing satisfactorily.

The implementation of the Seeds Act was again delayed but it is now certain both the Seed Certification Scheme and Seed Regulations will be promulgated later 1970 or early 1971.

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Arnott, M. S. (Miss). Genetics Conference in Pretoria. 14th–16th July, 1970.

Broodryk, S. W. Dr. Visit to Pretoria and area. 20th–24th April, 1970.
Broodryk, S. W. Dr. Visit to Mozambique to discuss problems of cotton pest control. 3rd–5th February, 1970.
Barnes, D. L. S. African Grassland Society held in E. London. 19th–22nd January, 1970.

Cackett, K. E. International Horticultural Congress Israel. 17th–26th March, 1970. Itinerary starts from 11th March–8th April).
Clatworthy, J. N. Dr. Grasslands International Congress in Australia. 17th February–29th May, and visit to Research Stations in New Zealand and Australia.
Clowes, R. Visit to Lorenco Marques for training in Fibre Quality Testing. 14th March to 13th April, 1970.
Cowan, E. D. Visit to South Africa to present paper at Conference of the South African Society of Animal Production. 21st–24th April, 1970.

Donovan, P. A. Attended International Red Locust Control Service Conference, Rome. 9th–16th November, 1969.
Donovan, P. A. S.A.R.C.C.U.S. meeting of Standing Committee on Plant Protection in Malawi. 10th–13th August, 1970.
Drummond, R. B. Collecting Expedition to Zambia. 19th October–2nd November, 1969.

Elliott, R. C. Dr. Presentation of paper at South African Society of Animal Production Conference. 21st–24th April, 1970.
Evans, J. Soil Science Conference in Bloemfontein. 31st March–3rd April, 1970.

Gledhill, J. H. Visit to Mozambique (Cotton Pests). 3rd–5th February, 1970.
Gledhill, J. H. Visit to Malawi (Cotton Pests). 16th–17th March, 1970.
Gledhill, J. H. Visit to South Africa (Cotton Pests). 20th–24th April, 1970.

Hanssen, K. B. S.A.R.C.C.U.S. Sub-Committee Meeting in Pretoria. 14th–16th October, 1969.
Holness, D. H. Attended the South African Animal Production Conference in Durban. 21st–24th April, 1970. (Symposium on Production from Wild Ungulates.)
Hayter, C. N. Visit to South Africa to larger cut flowers and bulb growers. 9th–11th February, 1970.
Hildebrand, G. L. Visit to U.S.A. to obtain information on Groundnut breeding. 27th July–31st September, 1970.

Johnson, P. T. C. Visit to present paper at the S. African Society of Animal Production Conference. 21st–24th April, 1970.

Keen, P. R. Attendance of 14th World Poultry Congress at Madrid. 5th–13th September. Various visits on continent and in U.K. (Duty whilst on leave for 45 days from 5th September.)

Land, D. A. Visit to South Africa. 20th–24th April, 1970.

Mavi, S. Collecting expedition to Chobi National Park, Botswana. 16th–29th August, 1970.
Martin, G. C. Attended 10th International Symposium of Nematology in Rome. 8th–13th September 1970 and spent seven days thereafter with Professor Scognalamichio in Rome.
Mills, W. R. Visit to South Africa. 20th–24th April, 1970.

Morkel, W. Visit to Angola for information on coffee. 26th May–23rd June, 1970.
Muller, T. Collecting expedition to Zambia. 19th October–2nd November, 1969.

Nelson, S. W. Dr. Genetics Conference in Pretoria. 14th–16th July, 1970.
Nicholls, E. B. (Miss). Visit to South Africa from 7th March–22nd March, 1970. (Visit the Pretoria Seed Testing Station and the Division of Botany.)

O'Donovan, W. M. Visit to present paper at South African Society of Animal Production Conference. 21st–24th April, 1970.
Olver, R. C. Genetics Conference in Pretoria. 14th–16th July, 1970.

Parkin, J. C. Visit to Pretoria to attend Symposium on Mycotoxim. 31st August–2nd September, 1970.
Payne, C. B. International Horticultural Conference in Israel. Itinerary starts from 11th March–30th March, 1970.
Purves, W. D. Visit to research institutions in England and Europe covering six days—from 21st–26th March, 1970, and attended Congress of the South African Society of Soil Science in Bloemfontein from 31st March–5th April, 1970.

Robinson, J. C. International Horticultural Congress in Israel. 11th March–8th April, 1970.

Rodel, M. G. W. Grasslands International Congress in Australia and tours in New Zealand. 25th March–23rd May, 1970.

Saunder, D. H. Dr. Attended Soil Science Congress in Bloemfontein. 30th March–4th April, 1970.
Saunder, D. H. Dr. Attended International Red Locust Control Council Meeting in Blantyre. 2nd June–4th June, 1970.
Steyn, J. J. Attended Animal Science Conference in Durban. 20th–24th April, 1970.

Thiran, P. U. Spent five days in South Africa on visits to the Research Institute at Nelspruit and other large estates at Tzaneen and Barberton to discuss problems on tea production.
Tattersfield, J. R. Attended Genetics Conference in Pretoria. 14th–16th July, 1970.
Toots, H. Attended the Annual Congress of the Limnological Society at Stellenbosch. 6th–10th July, 1970.

Vorster, T. H. Dr. Attended the S.A.R.C.C.U.S. Standing Committee meeting on Animal Production in S. Africa. 20th–24th July, 1970.

West, O. Dr. Attended S.A.R.C.C.U.S. Standing Committee for Conservation and Land Use Planning Meeting in Swaziland. 18th–23rd January, 1970.
Wilson, J. H. Attended Tea Research Foundation Conference (meeting) in Malawi. 20th–24th October, 1969.
Wilson, K. J. Attended VIIth International Congress of Plant Protection. 20th–26th September, 1970.

Visitors to Rhodesia

Mr. Henrotin, General Manager of Cox, Wallace and Comp. (Ranching) in Congo. Visited Henderson and Matopos Research Stations over period 6th–8th October, 1969.

Dr. M. K. P. Meyer of Department of Agricultural Technical Services, Pretoria. As guest of Department of Research and Specialist Services visited Rhodesia to conduct survey of mite and wild plants.

D. J. Cowley. Visit to discuss likely use of organs-mercury and fluorine compounds in Agriculture in Rhodesia, on 17th December, 1970.

Prof. J. M. P. Geerthsen, Genetics Department of the University of Pretoria. Visited Salisbury Research Station complex, Chiredzi and Gatooma Research Stations.

Messrs. Monteiro and Marcelino, from Angola. Repeated visits to Salisbury Research Station complex for two weeks from 21st January, 1970.

Officials of the South African Potato Control Board. Visited Rhodes Inyanga Experiment Station and had discussions with the Minister of Agriculture from 26th–28th January, 1970.

Mr. van der Linde of South African Bureau of Standards. Visited Gatooma for two weeks and Branch of Plant Protection for one day from 15th–28th February, 1970.

Messrs. Tunstall and Munro, from A.R.C., Malawi. Visited Head Office and Gatooma Research Station to discuss plant breeding from 6th–11th March, 1970.

Retief, D. F., from Pretoria. Visited Gatooma Research Station on 24th April, 1970.

Dr. J. van Marle. Soetvelde Ltd., Anglo American Corp. Visited Rhodesia and had discussions with Messrs. Raath, Louwrens and Dr. Vorster on 20th March, 1970.

Dr. Polge. Brief visit (22nd May to 24th May, 1970) *en route* to Britain to give opinions on semen storage and pig breeding.

Prof. H. F. Heady of School of Forestry and Conservation. Visit to Rhodesia. 6th–12th June, 1970. Gave advice on pasturage in relation to veld life management and visited Matopos, Henderson and Grasslands Research Stations.

Engineer Vitanova from Farmer Settlement in Northern Mozambique. Visited Salisbury, Henderson, Grasslands and Gatooma Research Station over the period 15th June–3rd July, 1970.

Prof. Oberholzer and Dr. Schwarz of the University of Pretoria. Visit to Chiredzi on the 10th July, 1970.

Messrs. Chona, Lunga, Spurling and Gray of the Crop Science Society. Visit to the Henderson, Salisbury, Rhodes Inyanga, Chiredzi Research Stations from 15th–23rd July, 1970.

Dr. M. A. Siddigi of Bvumbwe Research Station, Limbe, Malawi. Visit to Branch of Plant Protection and Chipinga Experiment Station, from 7th–12th September, 1970.

Mr. Pape of Makoka Research Station, Malawi. Visited Chiredzi Research Station in September, 1970 (date unknown).

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ORGANIZATION AND STAFF

Organization

Since the transfer of functions in the Tribal Trust Lands to the Ministry of Internal Affairs, there has been no further change in the organization of the department.

Senior staff

During the year there have been 18 resignations and three transfers to other departments. The untimely death of Mr. G. Rowe, Provincial Conservation and Extension Officer for Mashonaland North, and three retirements accounted for the remainder of the staff wastage.

The vacancy position at the end of September was made up as follows:

Conservation and Extension Officers	15
Conservation Officers	3
Subject matter specialists	6
Total	24

New appointments during the year amounted to 24 and five officers joined the department on transfer from other departments.

Junior staff

A small number of vacancies have occurred due to resignations, discharges and retirements. There has been no problem in filling these vacancies.

Administrative staff

The turnover of Administrative staff has been very high with no less than 20 resignations, four transfers to other departments, and one death. The inability to retain stenographers and typists is becoming a serious problem.

New posts

The establishment was increased by the addition of the following posts:

2 Conservation and Extension Officers (Conservation teams).
1 Extension Specialist (Horticulture).
1 Extension Specialist (Irrigation).
1 Research Technician.
1 Registry Classifier.
3 Trainee Technician/Technician/Higher Technician (Engineering). These three posts are authorized temporary posts for one year.

In addition 1 000 additional hours of part-time clerical assistance was provided for Group Officers.

One post of Extension Specialist (Tobacco) was redesignated Extension Specialist (Agronomy/Irrigation) and one post of Clerical Assistant (E.G.O.) was redesignated Registry Clerk.

Housing

No funds were available to build any houses for European staff this financial year. Unless more money is made available it will be a long time before the needs of the department are met.

The provision of adequate housing for African staff continues to be a major problem. However, funds for eight units have been provided this financial year but even at this rate it will take at least ten years to arrive at a satisfactory housing position. The provision of additional funds for maintenance is also very necessary.

Office accommodation

There has been an improvement in this direction and composite blocks for government employees are expected to be built or started at Mount Darwin, Sinoia, Gatooma, Umtali and Fort Victoria this financial year. Office accommodation at Nuanetsi, Rusape, Filabusi and Gwanda remains unsatisfactory.

Water supplies

The need for rainwater storage tanks for Extension Assistants in Purchase Areas to augment existing sources of supply has been highlighted once again. Dry conditions in the Victoria Province have made it necessary to transport water long distances for the domestic use of some Extension Assistants. All new houses not provided with piped water have tanks and guttering installed. The department has continued to press for tanks and guttering for existing houses without these facilities.

Transport

Most of the European staff used their own transport during the year but rising costs have caused a number of officers to explore the possibility of reverting to the use of government transport. The review of mileage rates is eagerly awaited by field staff, particularly those who travel over dirt roads. The reduction of 10 cents

to 5 cents per mile in payment of mileage performed on duty over the 12 000 miles limit has been a cause of dissatisfaction to all officers who, for reasons beyond their control, have been required to exceed this figure.

Visits to other countries

Study tours, which have always been regarded as an important and effective means of establishing contact with workers in the same field, with a view to exchanging technical and scientific knowledge and to keep abreast of current developments in the different aspects of the department's work, have been maintained at approximately the same level as last year. Details are shown in Appendix I.

Boards, meetings and conferences

By the very nature of the department's intimate involvement in almost every aspect of the agricultural industry, it is represented at a large number of committees, the details of which are listed in Appendix XI.

Staff training

For middle and higher grade officers, training emphasis on veld and farm management has continued but in addition, obligatory practical courses in Mechanical Conservation were arranged for all European field staff. Further detail is given in other sections of this report and also in Appendix IVA and Appendix IVB.

THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION

The weather

Good early rains, starting in mid-September, fell in many parts of the country. These continued until the latter half of December, then ceased almost entirely, resulting in a most difficult season for crop and livestock producers. Scattered rainfall occurred in February, March and April, but this was extremely variable in intensity and tended to be very localized and thus did little to alleviate the drought conditions. Many areas reflect a seasonal deficit of 30–45 per cent.

A very severe hailstorm in April devastated coffee, orchard and vegetable crops in the Umtali, Odzani and Vumba areas. The estimated loss and damage to coffee alone exceeded $200 000.

The winter has been mild with occasional frosts occurring only in susceptible areas.

Soil conservation

Arable areas

The standard of soil conservation measures is still far from satisfactory and is, indeed, a matter of concern. The results of a recent survey in two of the ICA's in the high rainfall areas, to determine the adequacy and standard of mechanical conservation measures revealed a most disturbing position. According to the survey only on 25 per cent. of the farms in the ICA concerned are the conservation measures considered adequate and up to standard, whilst on the remainder it is classified as fair to poor. This state of affairs is, regrettably, not unique nor confined to this area, but on the contrary, reflects the position obtaining in many other ICAs in the high rainfall areas of the country. Action and concerted efforts are necessary to arrest this deterioration in general conservation from continuing.

The extent of the pegging programme during the year is illustrated in Appendix V which details the work done in each province. In all 7 759 miles of contours and storm drains were pegged, which is an increase of 911 miles on last year. Similar increases are also shown for the miles of waterways and roads pegged for this year. Approximately 853 miles of contour remained unconstructed in the farming areas at the end of September.

Veld management and pastures

Interest in veld and pasture management has continued to increase with the result that present staff, both in the specialist pasture section and in the field generally, has been unable to cope with the demands for veld management planning and pasture advice.

There are disturbing reports of poor animal performance and low reconception rates, and farmers running short of grass in some areas under the short duration systems of veld management. While most of the problems encountered are associated with the non-observance on the part of many farmers of one of the basic principles of veld management, viz. stocking rate, there are other contributory factors involved. I would like to reiterate the importance of proper use of our

veld resources, implying the adoption of a stocking rate, a grazing system, and the running of a class of livestock which will produce the greatest volume of forage and livestock gain on a continuous and sustained basis. The grazing animal and veld are complementary and should be regarded as inseparable when assessing maximum sustained veld and livestock production.

While problems have been encountered with the implementation of advanced systems of veld management based on the short duration grazing system, the interest in sound veld management and utilization has been maintained, as is evident from the demands for assistance in planning indicated in Appendix III.

It is satisfactory to note that 774 farms were planned during the year, thus giving a total for the two years since planning started of 1 193 farms. In terms of percentages 12 per cent. of the farming areas have been planned in the year under review. By adding the percentage of the previous year the total is 20·8 per cent. or 8 455 033 acres.

Another 452 farms or 1 796 745 acres will have been planned when the present outstanding applications have been dealt with.

The above figures include purchase areas where there is a considerable interest; lack of finance is retarding progress in this sector in particular.

The need for bush control over large areas of Rhodesia remains one of the pre-requisites for increased herbage production. As more information is obtained, it becomes more apparent that this control should be highly selective and well planned. In the past, there has been a tendency to apply bush control as a blanket treatment. Ring barking remains the most economical and cheapest form of control.

Interest exhibited in the establishment of highly fertilized pastures has waned in view of the doubtful economics of it in comparison with crop production. The department continues with several co-operative fertilized pasture trials established some two years ago with a view to determining the practicability and economics of these as a means to augmenting farm income on an economic basis. In the light of results obtained the trials have now been modified.

Water conservation

There was a further decrease in the number of dams and weirs built during the year, as compared with the number built in previous years. Similarly the total capacity of those built during the year is well below the capacity of those built in previous years.

Detail by provinces is shown in Appendix VI and a comparison of the position with last year reflects a very marked drop in the number built in the two Mashonaland Provinces, a less marked reduction for Victoria Province, roughly the same number as last year for Midlands, a moderate increase of 10 for Matabeleland and 24 in the case of Manicaland.

Reference to Appendix VII highlights the fact that Government units run by the department constructed just over half the total number of small earth dams, i.e. 86 as compared with 163 constructed by farmers and contractors.

Field trials and demonstrations

Livestock and grazing trials

The stocking rate grazing trial at Lupane had considerable impact on the farmers in the Gwaai and Matetsi ICAs. The trial again demonstrated that reasonable animal production was possible on the Kalahari sands provided ring-barking is used and stock given adequate protein supplement in winter.

Additional fencing to cater for a short duration grazing system was completed on the Tuli grazing demonstration trial. Bush clearing as a method of increasing dry matter yields of grass and animal weight gains was again clearly demonstrated.

The existing grazing trial at Masera was recently reorganized to compare a short duration grazing system with a one herd three paddock split season system. The stocking rate of one livestock unit to 20 acres proved too heavy for the season on both systems and had to be reuced to one livestock unit per 40 acres.

Critical crop field trials and test demonstrations

The Department, in close co-operation with the Department of Research and Specialist Services, carried out 25 critical field trials and demonstrations. These trials covered the whole range of crops, excluding tobacco. The critical trials

were variety, irrigation and trace element trials. The test demonstration trials demonstrated cultural practices and the suitability of crops to particular ecological areas.

A final collated report on the 19 bush control demonstration plots set up throughout the country in 1967–68 is being prepared. However, due to numerous discrepancies in the tree mortality assessments, a last check on survival rates will be made between December and February. A number of additional observation trials have been established, mainly to test Tordon 101 and 2.4.5.T, with foliar spray and stump treatments.

SPECIAL ACTIVITIES

Engineering

The last quarter of this year has been the first time that all professional posts in the Engineering Branch have been filled for many years. In addition, the permanent posts for the new technician grade have also been filled but it will take several years before the benefit of these technicians will be felt because of the formal training programme required for trainee technicians.

The most noticeable response to the Engineering Branch extension work has undoubtedly been on methods of better tillage and tillage for moisture conservation. This interest has been greatly stimulated by the encouraging results obtained by leading farmers who have planted crops on a field scale, based on the minimum tillage systems and techniques used in tillage trials during the past four years.

Agricultural Engineering Centre

The Agricultural Engineering Centre at Hatcliffe is now beginning to show signs of development and buildings are at present being erected on both the department's and the Standing Committee on Agricultural Mechanization's (SCAM) building sites. Limited water will be available before the end of the year for irrigation and the testing of irrigation equipment.

Approximately half of the total arable area is at present being laid out with a straight and parallel contour system.

Tillage trials

No new trials were started last season because of the staff position which made it impossible to guarantee that the critical work could be carried out at the correct time. A preliminary observation trial has been started for the 1970–71 season which will provide sufficient information to design a limited tillage and moisture conservation trial on a proper statistical basis for the 1971–72 season. The depth of ploughing trials and the minimum tillage trials on both red and sandy soils continue to give encouraging results and provide the basic information to advise farmers on the advantages of various tillage techniques. A new large scale field observation trial has been designed specifically for the Tengwe Area and will be carried out on several farms during the 1970–71 season. The object of this trial is to try and overcome the problems associated with the economic necessity of having to crop continuously on steep slopes and phyllite soils which have a very poor infiltration rate.

Machinery development and testing

The main work that has been undertaken during the past year has been on behalf of the Grain Producers' Association of the Rhodesia National Farmers' Union (RNFU) in conjunction with SCAM. These projects were:

(*a*) Laboratory tests at various drying regimes of maize grain.

(*b*) The testing of maize conveying machinery.

(*c*) A field evaluation of harvesting and threshing machinery.

In addition to the above, the following smaller but important projects were carried out:

(i) The testing of cheap locally produced ox carts.

(ii) The judging and development of machinery for the destruction of cotton plants in conjunction with the Rhodesian Cotton Growers' Association and SCAM.

(iii) The testing of ox ploughs submitted for the competition organized by the Ploughing Association of Rhodesia for the design of an improved single furrow ox plough. This work will continue until about July 1971.

(iv) The testing of two simple hand planters on behalf of the Cotton Growers' Association.

(v) An investigation into the distribution characteristics of wheat and fertilizer applications from aircraft.

(vi) The development of a prototype implement for making 4 ft. beds to be used in conjunction with flood irrigation.

(vii) The development of a series of modifications to existing farm machinery to enable "range-pitting" to be carried out on the veld.

Extension

The main emphasis on extension has undoubtedly been in connexion with tillage in its broadest sense, and the demand for the Engineering Branch specialist in this field continues to increase. Extension on the farm building section has been mainly connected with maize bulk handling and indications are that this extension has been very successful. Requests for advice from the farm building section have substantially increased but with the appointment of the Farms Building Technician, it has been possible to meet this demand.

Training

Courses run at the Farm Machinery Training Centre, Domboshawa, have increased considerably over last year. Of the 31 courses held, 17 were for Conex staff, eight were for European farmers and their staff, two were for African Purchase Area farmers and four were for the Ministry of Internal Affairs. In addition to the courses run at Domboshawa, there was a mechanical conservation course run at Head Office for new conservation officers and a similar one for field officers of the Ministry of Internal Affairs. The Farm Buildings Section ran a five day course for the Ministry of Internal Affairs. The four mobile ox equipment training units operating in Purchase Areas ran a total of 76 courses for 1 116 trainees and in addition, 44 field days mainly demonstrating plough setting, attended by 1 003 farmers. The mobile tractor training unit ran five two-day courses in Purchase Areas for 50 trainees.

Conservation Working Account

A total of 44 dams were completed in European Areas, 20 in Purchase Areas and 17 in Tribal Areas. The total productive hours for the year ending 30th June have dropped from over 16 000 for 1968–69 to just under 13 000 for 1969–70. During the same period, the profit of just over $6 000 has dropped to a loss of just over $22 000 for 1969–70. A considerable amount of the overall drop in work done has undoubtedly been due to the reluctance of the farmers to commit themselves after several poor seasons but even with this overall reduction in work, it would be possible to make a profit or break even if farmers could be encouraged to make early applications for the necessary loan funds. This would enable the Working Account to plan their programme to eliminate long periods without work followed by requests far in excess of what could be done at the time, thus resulting in turning away a considerable amount of work which could otherwise have been quite easily undertaken.

Husbandry

Except for a vacancy in the Agronomy section and the secondment of the Senior Tobacco Specialist to the Prime Minister's office as Scientific Liaison Officer, the Branch has been fully staffed.

Specialist officers have devoted much time to staff training, active participation in field days, discussion groups and the writing of large numbers of technical articles for the agricultural press.

One of the Animal and Pasture Specialists attended a high level sheep production course overseas.

The Pasture Specialist attended the South African Grassland Conference.

Agronomy general

Diversification to replace the income formerly derived from tobacco has led to much larger acreages of alternative crops being grown. This, in turn, has led to overcropping above the land-use capability of the sandveld soils, resulting in extensive erosion. This problem is closely tied to the lack of profitability in farming.

The early cessation of the rains has once again demonstrated how vulnerable the diversification programme is, as long season crops have replaced a short season crop such as tobacco. It has become obvious that it is necessary for farmers to implement measures to offset the effects of drought and improve the production potential of dryland farming apart from irrigation.

The following measures have been advocated as a means toward achieving this objective:

(*a*) Minimum tillage techniques.

(*b*) Incorporation of as much organic matter as possible to increase infiltration and reduce run-off.

(*c*) Early ploughing will not only reduce preparation costs but will enable moisture to be carried over from one season to another. This will facilitate early planting on lower falls of rain than is required under dry late ploughing conditions. This will also make the various water planting techniques possible.

(*d*) The growing of crops suited to the particular agro-ecological areas.

(*e*) Use of crop varieties, particularly with maize, which are adapted to short seasons, and can tolerate some moisture stress at critical stages of development.

(*f*) The use of rotations in which short season crops such as soya beans or green crops are grown in rotation with long season crops such as cotton. The carry over of moisture allows for the early establishment of the long season crop.

In the case of maize, there has been a tendency for farmers to fertilize for the maximum potential of the variety, rather than the levels dictated by the agro-ecological environment. Farmers by using their individual six-year mean average yield as a basis for the level of inputs will decrease costs and improve their profits.

Pest and Weeds Advisory Services and Inspectorate

A total of 6 239 inspections were made under the Plant Pests and Diseases and Noxious Weeds Acts. During the year, 205 prosecutions were finalized and 42 are pending against farmers who have failed to comply with the requirements of the Plant Pests and Diseases Act or Noxious Weeds Act.

Twenty infestations by cigarette beetle were found and reported and in all cases, satisfactory control measures were carried out. Several reports of minor infestations in consignments of tobacco from farms were reported, but investigations revealed no signs of farm infestations.

The demand for herbicide advisory work is on the increase. Several herbicide trials were carried out by the Section.

Apiculture

Interest in bee-keeping has continued and it is now estimated that Rhodesia has produced some 400 tons of honey during the year under review. Whilst the local supply position is further improved, demand still remains unsatisfied.

Irrigation

River flows generally, although not good, were not abnormally low for the time of year. Most farm dams, other than those in Matabeleland held their normal supplies at the end of the year under review. The major irrigation dams in the low veld, however, were at a significantly low level as was the case last year, as is shown by the following figures:

Dam	*Level at* 30.9.69	*Level at* 30.9.70	*Highest level during* 1970
Kyle	3 373	3 364	3 377
Bangala	1 708	1 710	1 740
Umshandige	3 043	3 041	3 054
Manjirenji	1 757	1 752	1 763

In Matabeleland the position was a lot less favourable to the irrigators with approximately 35 per cent. of the installed irrigation area not being irrigated due to water shortage. No irrigation was possible from either the Matopos or the Mananda dams, and at the Umgusa Scheme water was rationed to about 70 per cent. of the normal winter supply. For the second year in succession there was no surface flow in the lower reaches of the Umzingwane River and irrigators in the Beitbridge area had to spend large sums of money on extending their sand water abstraction units.

Matabeleland reports that because of acute water shortage, there has been a marked interest shown by the farmers in improving their efficiency in water use. Lengths of run have been reduced in general by 50 per cent. bringing them down to departmental recommendations.

Seed bed preparation and land levelling have also improved.

Most irrigators were so relieved at having some dry weather in January that they did not recommence with irrigations until their crops were showing distinct signs of water stress. By the end of January, daily pan evaporation readings had reached excessively high figures and most farmers were unable to maintain a suitable moisture status. River flows became dangerously low in

February. However, late rains in March and April generally filled farm dams and put river flows back to normal.

Maize yields were adversely affected by the weather, but cotton on the other hand did extremely well. Cotton seemed to withstand the restricted waterings in January and February fairly well and obviously benefited from the reduction in insect pests brought about by the hot and dry conditions.

New thinking in irrigation

In certain parts of the country where irrigation necessitates water being stored throughout the winter, and where the climate is sufficiently temperate to allow for the growing to extend into April, it may be necessary to have second thoughts on our accepted concepts of efficient water usage.

There are strong indications that under such conditions limited amounts of water could most beneficially be used in the following manner. Plantings would be delayed until the advent of the rains and thereafter crops would be irrigated to an optimum moisture regime from water caught in the dams during the planting and subsequent rains. Under this system we would be making full use of water stored in dams at a time when the full storage capacity was available and not, as under current practice, losing a considerable amount by evaporation before the August-September pre-planting (or soil storage) irrigations.

Estimated surpluses in storage dams towards the end of the summer cropping season could be used to grow late summer or autumn quick maturing crops such as beans on adjacent lands.

Admittedly, this system is unlikely to be of benefit to farmers on the Marandellas water shed with its short growing seasons, or for that matter where adequate water is available throughout the year. However, from the few isolated but encouraging results so far obtained, a further study of this new concept is warranted.

Keen interest has been shown in the Israeli "drip feed" irrigation equipment and the Manicaland Irrigation Specialist was sent to Israel in December to gain first hand knowledge of this method and its practicability in Rhodesia.

Advisory work

All specialists report spending most of their time on advisory and investigational work for farmers who were entering the field of irrigation for the first time. The majority of these newcomers are successful, particularly those who were successful tobacco growers. However, there is a small minority who have been following a continuous downward trend due to their lack of managerial ability, and who have turned to irrigation in the hope that it would serve as a turning point, only to find that increased losses have resulted.

In general, however, it is pleasing to be able to reiterate a statement made last year, i.e. that there has been a very marked improvement in the efficiency of irrigation farming throughout the country. With few exceptions the farmer response to irrigation field days and symposia has been exceptionally good.

In the farming areas, irrigation specialists made 703 farm visits and had 410 office interviews with farmers in connexion with the design of irrigation schemes.

Training

A successful ten day in-service training course was run in Salisbury, attended by 16 participants, including one from Internal Affairs, two from Economics and Marketing, one from Gwebi Agricultural College and one from a fertilizer company.

An innovation this year was to run a similar course for employees of commercial firms. Twelve participants completed the full course and judging from the letters of thanks received it must have proved beneficial. One result has been that the Head Office of one firm which is in Johannesburg wrote asking for copies of the departmental Training Handbook for distribution to their South Africa Branch Managers.

Nine field days and 27 discussion groups on irrigation were organized.

Investigation and Development

The initial site development work has been completed for the Hatcliffe sprinkler testing station and it is hoped that this will be operating by the end of 1970.

Sprinkler tests, mainly coefficient of uniformity tests, were carried out for locally manufactured sprinklers using temporary sites at Gwebi and Henderson.

Investigations into vlei drainage were carried out in conjunction with the Department of Research and Specialist Services. Trials have been designed and will be carried out. The object of the trials is to investigate the effect of shallow open drains on grass production and the water regime of vleis.

Practical assistance was given to local firms in testing and modifying irrigation equipment.

Training

In addition to departmental needs, specialist training for the agricultural and other field officers of the Ministry of Internal Affairs has made substantial demands on the services of the department as a whole and Training Branch in particular.

Generally the reduction in size of the department has assisted in bringing together the specialist branches and particularly has training been more closely associated with field operation.

In the broad context of training, interest has been positive in the field of programme planning. Taught as part of extension methods this subject is, however, much more than a mere method; it is a fundamental of successful extension operation. In application it can be rudimentary and yet it is capable of infinite refinement. The principles of programme planning have long been taught and applied with modest success; but in the past year there has been a more positive approach to programme planning as a *modus operandi* for extension with a better grasp of its essentials. The formulation of plans presents difficulties in many situations in the field but rewarding results can be seen in some areas: the Mazoe group and Featherstone ICA and also in Matabeleland as a whole, where hard won and excellent progress is being maintained as officers develop better and better programmes, with farmers increasingly involved in implementation. Technical subject matter training has focussed on Farm Management and Veld Management. Courses have been mainly held at provincial venues.

A full programme of obligatory training for newly appointed officers has included two courses in Extension Methods; two courses in Farm Management and Work Study Principles; two courses in Land Use Planning and one course in Mechanical Conservation. Arrangements are in hand to augment all obligatory courses with field follow-up exercises.

In addition to the obligatory courses mentioned, there were two national level Irrigation Courses and a Training Methods course for specialists and officers with training responsibility.

The services of the Branch continue to be in demand for training requested by other agencies and departmental courses have included a number of guest participants from Malawi, the fertilizer companies and other departments of Government. Trainers are giving an increasing amount of support to the British South Africa Police promotion courses; they also serve Community Development training and various courses at Ranche House College. The Chief Training Officer has given four lectures to the final year class at the University College Agricultural degree course; one lecture to the UCR Certificate of Adult Education course and one lecture to the UCR Certificate in Field Ecology course.

The Department has continued its close association with the Natural Resources Board through the activities of the Resources and Conservation Education Committees. This is an area of work that has become complicated and obscure as a result of the relocation of conservation education responsibilities involving the Ministries of Agriculture, Internal Affairs and Education, the Department of Community Development Training and the Young Farmers Club movement. Attempts are being made to clarify this situation.

Recruits

Sixteen of the recruits received into the Department during the year were given instruction in elementary surveying, including the use of the level, contour survey, plan drawing and extension methods.

Domboshawa Training Institute

In addition to a very full programme of training for Internal Affairs Officers, the Institute has been heavily committed to training African staff from Purchase Areas. The Domboshawa Centre is a complex for community development training and is host to a wide variety of courses. The Department is fully involved in the total activities of the Centre.

Mobile Training Unit

The Department has only one unit which, due to accommodation problems at Domboshawa was

transferred to Henderson Research Station and operated from there during the year. During its year of operation the unit has travelled 11 657 miles and contacted 14 104 people.

Bus

The Department operates only one bus and this vehicle is relatively old and requires a lot of maintenance. Whilst the main purpose is to carry course participants, short trips were nonetheless organized for farmers to visit Research Stations. The bus travelled 13 203 miles during the year and a total of 4 343 passengers were carried.

Extension research

Work on the Agricultural Index for the Tjolotjo Tribal Trust Land is in its final stages. It is expected that techniques used in this investigation will have application in the Purchase Areas and European Farming Areas.

The section is conducting two surveys to discover farmers' sources of information; the first investigation deals with farmers in general and the second is related to tobacco growers in particular. Both these surveys are near completion.

Other inquiries relate to the effectiveness of Natural Resources Board publications and the particular effectiveness of a Matabeleland newsletter distributed to Purchase Area farmers.

Home Economics

This section operates essentially as a bureau, answering many inquiries. The Home Economics Specialist has published six articles in the *Rhodesia Agricultural Journal*; these have dealt with the utilization of locally grown fruits and vegetables. Five of these articles have been rewritten and published as leaflets. Recently released, these leaflets have been well received. The Home Economics Specialist also answers a wide range of queries from an equally wide variety of questioners and has a close consultative relationship with all the principal women's voluntary organizations.

Publication section

A substantial portion of the work of this section is related to broadcasting. Regular programmes for African listeners are wholly provided by the department. Material originating from this section is also the basis of other broadcasts and publication through other mass media. Much of the work consists of editing, preparing for publication, and distributing departmental and ministerial manuscripts. Several articles have been prepared for the Agricultural Handbook and many others have been revised and distributed.

An important booklet on Veld Management was compiled and the popularity of this booklet necessitated early and substantial reprinting.

Other important booklets dealt with crop drying; the re-use of sewage effluent and the management planning book was revised, updated and reprinted.

Youth extension

Youth work has become very complex, with a multiplicity of Ministries, departments and organizations operating in the field. There is scope for considerable expansion of Young Farmers' Clubs in Purchase Areas and to this end Victoria Province has trained all its field staff to attend to the special needs for clubs as clients of extension.

The Youth Extension Section has worked closely with the Education Departments and has also supported the activities of the Regional Conservation Education committees. In pursuit of the objectives to visit every education establishment three times each year, 115 visits have been made since February in Mashonaland, Manicaland and Midlands Provinces alone.

In addition to school visits, veld exhibitions were organized at Salisbury, Umtali, Marandellas, Gwelo, Fort Victoria, Bulawayo and Que Que. A general display was also shown at Wankie, Gwanda and Plumtree. Some schools found it impossible to visit exhibitions, but these were visited and were given a talk illustrated by slides. In total 32 000 students of all races have received information on the veld during the year.

During the August school holidays a camp was organized at Digglefold school, Marandellas. Fifty boys between the ages of 11 and 15 took part in this successful field exercise which was very popular. The camp work was practical. The boys planned a conservation project and then worked on its implementation.

In collaboration with two teachers of Morgan High School the Youth Section promoted a series

of conservation education comprehension exercises based on the "Animal" and "Trees and Shrubs" colouring books published by Mobil and the Natural Resources Board.

As part of its career guidance function the Section has participated in career days at all the principal centres of the country.

Farming inquiries from outside the country

Inquiries during the year exceeded 200 from residents of, mainly, the Republic of South Africa, but also from the United Kingdom, United States of America, Italy, Australia, Papua and New Guinea, Canada, South West Africa, the Argentine, the Channel Islands, as well as Central and Eastern Africa.

The bulk of these inquiries have been by correspondence with about 70 personal visits.

The booklet "Farming in Rhodesia", prepared by this department, has proved extremely popular and many letters of appreciation, as well as personal thanks, have been received.

Planning

Once again work was seriously affected by resignations. At the end of September there were five vacancies in the Planning Section and one vacancy in the Farm Management Section.

Regional Plans

The Marandellas Regional Plan is now complete and will be distributed soon. The Mazoe Valley Plan is nearing completion. All maps are complete and the write-up has been produced in draft form. In Manicaland, regional surveys of the Umtali North, Umtali South and Tsungwesi ICAs and the Mukuni Purchase Area are being worked on.

Farm plans

Sixty farm plans were completed in the European farming areas during the year.

Irrigation soil surveys

The Central Planning Team carried out a preliminary soil survey of the proposed Manesi/Umniati irrigation scheme (± 30 000 acres) near Enkeldoorn.

Settlement surveys

Viability reports and proposals for farm consolidations have taken up a tremendous amount of time for those officers based in the Purchase Areas. Of particular note is the work being carried out in the Wiltshire/Lancashire and Chemagora areas of the Midlands Province.

Work study

Activities in this aspect have been aimed at improving the efficiency of labour and tractor utilization in many fields of agricultural production. Advisory visits have been made to assist farmers in the application of proven techniques while study visits have been made to find out more about problems in particular types of agricultural production.

Farm Management

The main work has been to assist farmers in the preparation of suitable forward plans. This has been carried out in close co-operation with local extension staff, the Management Accounting Service of the RNFU and the Farm Management Section of the Economics and Markets Branch, Ministry of Agriculture.

The section was involved with drought relief work through the assessment of past performance standards for applicants. Considerable work was done in the collection of crop yield data for all farms in the country. Detailed work on climatic data by area is now in progress and attempts have been made to relate area crop yield to specific climatic data. To date, the work has been fairly successful.

Investigation into African Purchase Area farm viability has commenced and a pilot recording scheme has been launched. Processing of some data from African Purchase Areas for the past year is being undertaken with a view to determining profitability of this type of farm.

The section works very closely with the Management Advisory Services of the RNFU, the Farm Management Section of Economics and Markets Branch, and the Agricultural Economics Department of UCR. Five "Farming is a Business" seminars were conducted jointly during the year. Close contact is maintained with bodies involved in farm management problems such as the Land Bank and Agricultural Assistance Board, with assistance being given when requested.

Statistical mapping

Good progress has been made in European farming and Purchase Area mapping. Base maps have been drawn and overlays are in the course of preparation.

Veld management plans

A new mapping format was devised to standardize procedures, and this is being implemented. The drafting of veld management plan maps has taken up a high proportion of the Provincial Topographer's time, particularly in the Midlands and Victoria Province.

Field services

Personal visits to farmers are still the backbone of successful extension work and it is once more regrettable that these can only be made as a result of specific requests for assistance rather than as regular extension visits.

An interesting situation has developed because, on the one hand, field officers are of necessity forced to concentrate more and more on the interest group technique yet, on the other hand, this very technique in itself stimulates an increasing demand for the individual farm visit.

In the present situation with opportunities for farm visits limited, it is essential that field officers work to a plan agreed upon with their ICA Committees. Whilst more and more officers are already doing this to great advantage and efficient use of time, it remains a fact that the department as a whole has not yet completely adopted and applied this approach to maximum effect.

At both provincial and district level all provinces report an increase in the number of visits being made by farmers to departmental offices. Sometimes these are almost social in that farmers call in to find out what is going on, but by far the greater majority are to discuss farming problems which are these days usually financial.

Within provinces the services provided through mass media are chiefly concerned with the ICA and Group Newsletter. Otherwise the main use of this method is at the national level through the popular press, the RBC, important farming journals and, more recently, the RTV. The latter is becoming an increasingly important medium, particularly for the European farmer. The very large field days are not popular with farmers any more, probably because farmers feel themselves unable to discuss their specific problems in detail.

Analysis of Field Staff activities

A record of general extension work in the African Purchase Areas is shown in Appendix IX, Tables 1 and 2. For a general analysis of time expenditure reflecting field staff activity, refer to Appendix X.

For the main extension section in Appendix X covering Agronomy, Livestock, Veld and Farm Management, etc. the overall position has been maintained with a modest improvement in officer time spent from 44·7 per cent. in 1968, to 45·2 per cent. in 1969, and 47 per cent. in 1970. Within this section, however, there has been a gratifying increase in the time spent on veld and farm management but unfortunately this has been achieved at the expense of all other categories with the possible exception of Farm Planning which has remained comparatively static over the past three years.

Having drawn attention to the improved position for veld and farm management it should at the same time be noted that approximately equal time was devoted to veld management, irrigation, livestock and agronomy, including tobacco, with the total time for farm management still being by far the least of all other categories.

The total time spent on farmers' organizations, training courses and staff conferences remained the same as for last year. Although there was a slight increase in the time spent on inspections it is still appreciably less than that spent on this activity in 1968.

Approximately 2·0 per cent. less time was devoted to field days, shows, field trials, census and general extension liaison than last year, but almost exactly the same as for 1968.

While a little less time was spent on administration and publications as compared with the previous two years, there was a slight shift in favour of publications.

Crop production

Tobacco—flue cured

Early planted tobacco on the highveld which was well established before the heavy December

rains was very successful and the lower half of the plant, including cutters, were of very good quality. Quality declined in the top part of the plant.

In the northern areas, extremely little tobacco was established before the onset of the December rains, and during this period growth was poor. Some crops received little rain after January and as a result the northern area crops were not up to their usual standard.

Burley

Yields were higher than expected but quality was poor. Early planted crops grew well and where properly cured, produced good quality. Late plantings grew badly and cured worse. The curing season was the driest on record.

Maize

The wet start to the season caused a number of deficiencies in maize, particularly due to a lack of zinc. Work was carried out to endeavour to find the best methods of applying this and it was found that foliar application of zinc sulphate was better than seed dressing with zinc oxide. The mid-season drought affected most dryland maize crops at pollination, thereby reducing yields throughout the country. In general, early planted crops yielded well but those which were planted late, failed.

Sorghum

Most of this crop is grown in African Purchase Areas in the middle and highveld areas, although small acreages are still grown by European farmers, particularly in the Gatooma area.

Wheat

Wheat was grown almost exclusively as a winter crop and due to sufficient water supplies being stored from the December rains, ample water was available to see the crop through. As in previous years, some three-fifths of the acreage was grown in the lowveld and average yields there have shown a 20 per cent. increase. The winter was mild and little frost occurred. No reports of stem rust were received and an average yield of between 3 400 and 3 750 lb. per acre (17 to 18½ b.p.a.) was obtained.

Barley

This minor crop is grown under contract to the Maltsters in Manicaland and Victoria Provinces.

Rice

Rice was grown under irrigation in the lowveld but a serious outbreak of Blast (*Piricularia aryzae*) reduced the average yield on some farms from an expected 35 bags per acre to five bags per acre. The average yield, however, for the Chiredzi ICA amounted to 20 bags per acre. The nematode (*Pratylenchus zeae*) had some effect on yields, but only in limited areas. Due to these factors, and also the removal of the rice mill from Chiredzi to Bulawayo, it is expected that only a small acreage will be grown in the coming season.

Groundnuts

The acreage planted to groundnuts has dropped considerably from the peak in 1967–68 due to disappointing yields and, as a result, low cash returns.

The past season was a poor year for groundnuts and some irrigated crops in Matabeleland had to be abandoned due to a lack of water. Highveld crops were planted very late due to a dry November and the very wet December, consequently suffering from moisture stress at the end of the season. Future prospects for dryland expansion on European farms are minimal.

Progress with early-planted irrigated groundnuts at the Salisbury Research Station shows exciting prospects for the future. If experimental yields of 30 bags per acre can be converted to farm yields of 20 bags per acre, this could prove a most valuable export crop where irrigation is available.

Soya beans

The acreage planted to this crop doubled during the year but unfavourable weather conditions reduced yields considerably and only a 10 per cent. increase in acreage can be expected for 1970/71. Yields in the past season included one of 17 bags per acre under irrigation and 16 bags per acre on dry land. In the soya bean competition, average yields dropped from 10 to six bags per acre.

Future prospects are, however, excellent with the minimum prices announced at $8 per bag for 1970–71, $7 for the next year and $6 for 1972–73. Continued expansion can be expected. Farmers are beginning to appreciate that this crop has a number of hidden profits which, together, can give a good cash return to the farmer. The chief of these is that this crop costs less to produce than

maize. Poor years resulting in financial losses are not so severe when some of the maize has been replaced by soya beans.

Edible beans and peas

Most of the edible bean crop on European farms was grown for domestic consumption. In Purchase Areas, a selection of edible beans is grown. This is encouraging as it shows that legumes are being grown in crop rotations in these areas.

It has been a fairly good year for green peas in Manicaland where 2 000 acres have yielded an average of two tons per acre.

Potatoes

Difficulty was experienced with the variety Cedara which produced "hollow heart". However, other varieties fared well and little blight was experienced due to the dry conditions. The varieties Montclare and van der Plank are expected to go into production in the coming season.

Cotton

Many farmers experienced difficulties in destroying their 1968–69 cotton crop by the required date, and crops were seen growing well into the 1969–70 season. Even where crops had been harvested on time, destruction was difficult in the hard ground in August and September.

Only a small proportion of farmers water-planted their crops during October, 1969. Late rains in the previous year kept the water table so high that those who did so, benefited.

The wet soils during December inhibited seedling growth of later planted crops and roots were subjected to interference by herbicides for longer periods than normal leading to chlorosis. Herbicides were applied from the air in a number of areas and research into this continues. There was a large reduction in cotton on light soils due to the soil erosion hazards.

The season was comparatively pest free. Low volume applications of insecticides, both from the air and ground gave satisfactory results where pest infestations were small. Endosulfan was substituted for DDT in some areas and proved successful against red spider mite. Due to the short season and low yields, little difficulty was experienced in harvesting the crop. Labour was plentiful and the changeover from payment of a penny a pound to 10 cents for 12 lb. was achieved satisfactorily.

Prospects for the future include trials over 225 acres on European farms of the variety Del Cerro, a long staple cotton which was grown successfully at Gutsa in the Zambezi Valley.

Sugar cane

A good growth year has been experienced with sugar cane. The main drive in the sugar industry is continued efforts to eliminate Smut. Cane yields are expected to be above those of the 1968–69 season.

Sunflowers

The acreage planted to sunflowers continues to be fairly static and average yields of approximately 6 bags per acre were obtained.

Seed crops

Some yields of seed beans of up to 16 bags per acre were obtained in the lowveld areas where average yields were approximately 13 bags per acre. Seed bean trials at Chiredzi were severely affected by Halo and Common Blight.

Horticultural crops

Deciduous fruit

The peach crop was poor due to severe delayed foliation following the warm winter of 1969, losses due to hail storms and attacks by stinkbugs. The anticipated over-production did not materialize and market prices obtained were realistic. The apple crop was light and exceptionally good prices were received. Improved cold storage facilities have helped to extend the season and there is now a definite need to improve techniques in using this. Yields of 20 to 30 lb. of fruit per tree were obtained from four-year old apple trees from Umvukwes.

Apricots were in poor supply showing once more that they are poor adapters to our climate when grown on existing stock. Plums fruited well although flowering overlapped considerably. Expansion in the plantings of nectarines continued.

Citrus

The larger, older established citrus groves remained in production whilst smaller acreages

continued to be established for domestic and local consumption. Most trees had recovered from the devastating frost of 1968.

Viticulture

The past season was disastrous for grapes due to the intensity of the rain which resulted in disease becoming rife, with berries splitting and rotting. Those crops which survived did not have the characteristic flavours due to low sugar contents. Some varieties, however, stood up better to the heavy rains and those which matured later were in the main satisfactory. The past two rainy seasons have resulted in a number of growers taking out their vineyards. Large plantings for wine near Wedza are about to produce their first crops. Increased plantings in the Umtali North area have brought up the number of vines there to 80 000. These are now yielding between 6 000 to 9 000 lb. per acre on average. Wine grapes, due to the fact that they ripen in the dry season, gave satisfactory sugar contents. In Matabeleland, 18 000 gallons of wine were produced by one estate.

Other fruit crops

There has been a continued increase in the acreage planted to strawberries for commercial production and average yields of 3½ tons per acre continued to be obtained. The largest single acreage planted to strawberries is still in Matabeleland and has produced reasonably well both for the fresh and processing markets.

Nut crops

There are between 800 and 1 000 grafted macadamia nut trees planted in the orchards of the four main growers in the Eastern Districts but these are mostly young trees not yet in production Some 8 000 seedlings have been planted out. Three main orchards of pecan nuts have been established in the Eastern Districts, some of which are in production. There is a ready market for shelled pecan nuts.

Vegetables

The heavy mid-season rains restricted plantings and diseases were prevalent leading to crop shortages. The mild winter enabled producers to bring late crops to fruition, thus clashing with produce from the lowveld. Onions realized reasonable prices on the markets; the price per pocket did not rise above $3 whilst good quality onions realized 50c a pocket at the height of the season. A large acreage was planted to cucurbits in the Limpopo area for export and dry conditions led to high prices being realized for the crop in October/November. Supplies of table tomatoes were steady throughout the area, produce being sent from as far away as Beitbridge to Salisbury. Production of canning tomatoes at West Nicholson was disappointing due to Bacterial Canker and Russet Mite.

Tea

There has been a satisfactory expansion in tea production closely linked to marketing requirements. The Chipinga growers continue to expand and two growers have 500 acres between them. In all, some 2 850 acres of tea are now under irrigation. Plantings in African Purchase Areas in Manicaland total 70 acres and plans have been made to plant a further 75 acres during the 1970–71 rainy season. The first pickings have been taken from the original plantings in Tamandayi.

Coffee

Interest in coffee production continues to be shown by small holding farmers in the Vumba, Chipinga and Umtali South areas. The second processing factory at Chipinga was opened during August. Almost 4 000 acres have been planted to coffee and early plantings have now started to produce.

Fodder crops

Maize and sorghum are the main crops grown for the production of silage which is the standard winter feed on dairy farms in most parts of the country. It is usual now to make maize silage at a more mature stage of the crop. The acreage under lucerne has remained static.

Other crops

There has been an increased interest in pyrethrum growing particularly in the Marandellas area where a number of growers have obtained fairly good yields. Other crops are mostly grown on a market garden scale and include green peppers, sweetcorn, egg plants, carrots and celery. Mushrooms are being grown under intensive conditions by a few growers who seem unable to satisfy the market demands. Forty acres of pineapples are now

producing in African Purchase Areas in Chipinga. In addition, cut flowers are grown mostly around Salisbury and Bulawayo.

Drought

The short season, as a result of the early cut-off of the rains, once again emphasized the need for forward planning and the adoption of measures to counter the effects of the drought. Farming systems that are not in harmony with the ecological environment greatly increase the effects of drought.

The replacement of short season crops such as tobacco by long season crops such as cotton and the present maize varieties, tends to increase the effects of drought and diversification requires careful planning of rotation and cultural operations.

For the first time, the drought relief scheme was so designed to encourage farming systems in harmony with agro-ecological environment. It is known that farmers who practise conservation farming withstand drought better than those who do not observe and apply correct systems and methods of farming. Future drought relief schemes should be designed to assist only those who have made serious efforts to help themselves.

Livestock

Beef cattle

General

Seasonal effects in provinces were variable with weight gains declining early. Victoria Lowveld, however, had a very good season.

The upsurge in interest and numbers evident over the past few years in Mashonaland and Manicaland slowed down. It was a year of consolidation and efficiency in these areas continues to improve.

Supplementary feeding was required early in most areas. All areas report increased supplementary feeding, e.g. Matabeleland, excluding Region V, are up from 71 000 (71 per cent.) to 76 000 (75 per cent.) for breeding and young stock. However, feeding is often at too low a level, while in the cropping areas there is a need for more economical selective feeding.

Phosphate supplementation in summer is still inadequate.

Breeding

In the cropping areas, breeding herds continue to increase in size and number, though at a slower rate. Demand for heifers was weak indicating that changes in production patterns are likely to occur with more heifers being fattened for slaughter, as farms become fully stocked and calving percentages rise.

In the low rainfall areas there appears to be a swing away from weaner production to producing slaughter stock. In these areas there is still a tendency to look for new breeds, with a trend towards exotics and cross-breeding.

Fattening

Profit margins from pen fattening are so low that buyers are ill-advised to pay above CSC support prices for feeders. In several areas, particularly the marginal cropping areas, pen feeding has decreased.

The tendency to slaughter at $3\frac{1}{2}$ years rather than $4\frac{1}{2}$ years continues. The CSC chiller contract scheme has been very popular, with farmers achieving considerable success.

Fattening in African Areas

Both the number of farmers marketing through the CSC and numbers of cattle fattened show increases over last year, in spite of a poor cropping season. Details of numbers fattened are contained in Table 2 of Appendix IX.

Dairy production

Dairy production is mainly concentrated round the larger centres and there is a trend for larger producers to squeeze out the smaller producers. The drought seriously affected production costs this year and in all provinces, except Mashonaland, dairy farmers were seriously short of both roughage and grain.

There are still no indications of any marked drop in total dairy stock numbers and this is reflected by the high prices paid for dairy stock at dispersal sales. There still appears to be money in dairying, particularly the bigger producer, geared to produce all his herd's roughage and the bulk of his concentrate requirements.

Sheep

There are clear indications of a further small decline in farmers running sheep, especially in Mashonaland, but indications are that the majority of these have only run sheep over two or three seasons. On the other hand, overall sheep numbers have not declined markedly, although the rapid

rise in the national sheep population of the last few years has levelled off.

The market demand for good quality lamb and mutton is still well in excess of production and many farmers near the larger centres are obtaining better than CSC prices by selling direct to butchers.

The prospects of over-production in the immediate future appear to have receded, and sheep remain a profitable enterprise, for the efficient producer, particularly in the more intensive farming areas.

Pigs

The introduction of controls appears to have effectively limited any expansion that was taking place. Pig production is still profitable for the efficient producers, who are usually the larger producers. The introduction of quotas may well in time eliminate the smaller European producers.

Fish

Very little organized fish farming is done in Rhodesia, although a considerable potential exists. Several farm dams are stocked and netted periodically as a supplement to labour rations.

Rabbits

A steady flow of requests for information from plot holders is received. There is an increase in breeding stock in Mashonaland, especially Marandellas. Small scale producers find a ready market at 50c to 70c each.

Beef recording

Expansion in this scheme continued at a high rate. The number of sheets processed increased from 560 in 1967 to 2 394 in 1970. The total registered members have increased from 158 in 1968 to 288 in 1970.

Due to lack of staff, it has been extremely difficult to give adequate attention to the scheme. Reliance has been placed on students and latterly on an officer held against a vacant post. In spite of this the time taken to process records has been very markedly reduced and a number of improvements in format introduced.

A most useful meeting of breeders and the department's staff was held to discuss improvements to the scheme. Unfortunately, field follow-up is still quite inadequate, and much needs to be done to ensure understanding and proper use of records. For these records to reach their full potential value, they must be used intelligently. To ensure this, follow-up visits are essential.

Bull Approval Scheme

Some of the early enthusiasm appears to have gone out of the scheme, which is regrettable as the scheme is intrinsically sound and worthwhile. There is no doubt that part of this was due to the insistence on full official beef records for the approved bulls.

An interesting trend is that certain individual breeders also had their pedigree herds approved under the scheme, using the argument that it is wrong that less stringent standards should be used for pedigree bulls than are applied to grade bulls.

The Hereford and Sussex Breed Societies were still the most active in the scheme, although slowly increasing interest seems to be indicated from certain other breed societies.

Livestock Improvement Committee

The Committee continued its work dealing with the export and import of livestock.

Early in the year, the Minister's committee on bull performance and progeny testing completed its report, which was accepted in principle by the Minister. Included were proposals for a Livestock Improvement Act, an expanded Livestock Improvement Board, and an Animal Performance Testing Bureau.

Details of imports and exports are given in Appendices IIIA and IIIB respectively.

Acknowledgements

I would like to acknowledge, with thanks, the collaboration and help we have received from other departments and ministries with whom we work and, in particular, I am especially appreciative of the co-operation we have had in working with these bodies which are outside of Government—intensive conservation area committees, farmers' associations, the Rhodesia National Farmers' Union and many others.

To my own staff I would like to pay tribute and record my sincere appreciation of their loyal support and devotion to duty during the past year.

J. H. H. LOUWRENS,

Director of Conservation and Extension.

Visits to other countries

Name	*Purpose*	*Place*
Donkin, D. J.	Sheep management and diseases	United Kingdom
Norton, J. D.	S.A.S.A.P.	South Africa
Kille, T.	Burley tobacco sales	Malawi
Barclay-Smith, R.	Special duties	Malawi
P. Papadopoulo	Second Beekeeping Congress of S. Africa Federation	South Africa
Hill, J. C. R.	S.A. Grassland Congress	South Africa
Ivy, P.	S.A.R.C.C.U.S. Subcommittee for Land Use Planning and Farm Business Management meetings	Swaziland and South Africa
Mitchell, R. J.	Fourth S.A. National Survey Conference	South Africa
de Jong, J.	Method—Time—Measurement course	South Africa
Cormack, J. M.	S.A.R.C.C.U.S. meetings	South Africa, Malawi
Spear, A. J.	S.A.R.C.C.U.S. meeting	Swaziland
Elwell, H. A.	Various research establishments in connexion with soils and drainage	United Kingdom
Maitin, P. E.	To study Blaas system of drip feed irrigation and recent developments in irrigation technique	Israel
Watermayer, J. M.	Water Symposium, RSA Water Year, Natal 1970 Conventions	Durban
Tornbohm, R.	S.A.R.C.C.U.S. meeting	Swaziland
Bembridge, T.	Extension Methods Course	Netherlands

Publications

Author	*Title*	*Publication*
Ball, J. S.	Concrete irrigation furrows	*Modern Farming*
Barclay-Smith, R.	More hints on producing a profitable tobacco crop	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	The season in Lomagundi	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	The season in Lomagundi—spraying against disease	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	Comments on the tobacco crop in Lomagundi	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	The problems of hot spots and cold corners	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	Grading supervision is of the utmost importance	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	Tobacco grading—the myth and the mystery	*Rhodesian Tobacco Journal*
Barclay-Smith, R.	Malawi—land of the lake	*Tobacco Forum*
Burgess, M. W.	Ratooning and closed season for cotton	*Rhodesian Farmer*
Collett, W. E. and Jones, M. E.	Soya bean harvesting	*Modern Farming*
Collett, W. E.	Soya bean—applied nitrogen requirements	*Modern Farming*
Collett, W. E.	Oil seeds competition	*Rhodesian Farmer*
de Jong, J.	Work study and productivity	*Rhodesian Farmer*
de Jong, J.	Incentives in agriculture	*Rhodesian Tobacco Journal*
de Jong, J.	Production planning and control in farming	*Rhodesian Tobacco Journal*
de Jong, J.	Cotton reaping in relation to bulk handling	*Rhodesian Farmer*
de Jong, J.	A review of cotton bulk handling	*Rhodesian Farmer*
de Jong, J.	Information and advice for cotton growers, cotton water planting survey	Rhodesian Cotton Growers' Association
de Jong, J.	Work study on potato harvesting	Departmental publication
de Jong, J.	Work study aspects of coffee production	Departmental publication
Donkin, D. J.	Beef Recording Scheme Part II	*Rhodesian Tobacco Journal*
Donkin, D. J.	Modern developments in livestock production	*Rhodesian Tobacco journal*
Donkin, D. J.	Sheep in Rhodesia	*Rhodesia Agricultural Annual*
Donkin, D. J.	Ultrasonic pregnancy testing of sheep	*Rhodesian Tobacco Journal*
Donkin, D. J.	Beef breeding systems	*Stock and crops*
Donkin, D. J.	Heritability, theory and practice	Aberdeen Angus supp. to *Modern Farming*
du Toit, F. P.	Selection of barns for air curing burley tobacco	*Tobacco Forum*
du Toit, F. P.	Bulk maize handling in Rhodesia: present state of the art	*Modern Farming*
du Toit, F. P.	Treating timber on the farm	*Farmers' Co-op. News*
du Toit, F. P.	Four ways to handle grain in bulk	*Farmers' Co-op. News*
du Toit, F. P.	Burley tobacco barns: can they be made cheaper	*Rhodesian Tobacco Journal*
du Toit, F. P.	Prefabricated multi-purpose buildings on farms	*Farmers' Co-op. News*
du Toit, F. P.	Safety in bulk maize stores	*Stocks and Crops*
du Toit, F. P.	Thermal insulation in farm buildings	*Farmers' Co-op. News*
du Toit, F. P.	Burley tobacco barns	Rhodesian Burley Growers' Association
du Toit, F. P.	Maintenance of flue-cured tobacco buildings	*Rhodesian Tobacco Journal*
Gammon, D. M.	Economics of veld management system	*Modern Training*
Gammon, D. M.	Performance recording	*Afrikander Journal* (awaiting publication)
Going, W. D.	Macadamias	*Rhodesia Agricultural Journal*
Hayward, J. W.	Self-help measures against drought	*Rhodesian Farmer*
Hayward, J. W.	The drought, the problem in perspective (in 2 parts)	*Modern Farming*
Hill, J. C. R.	Veld management—no mystery	*Agriculture in Rhodesia* 1970
Hill, J. C. R.	Veld management in Rhodesia	Aberdeen Angus Club Handbook
Howden, R. H. G.	Edible beans	*Stock and Crops*
Jones, M. E.	Dr. McCanics case book (9 articles)	*Modern Farming*
Jones, M. E. and Locke, R. F.	Inventions and good ideas (3 articles)	*Modern Farming*
Jones, M. E. and Collett, W. E.	Detailed explanation of harvesting methods—Soya beans	*Modern Farming*
Jones, M. E. and Locke, R. F.	Closed season for cotton in middleveld areas	*Rhodesian Farmer*
Kemp, Mrs. Pauline	Introduction to preservation of fruits and vegetables	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Fruit bottling	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Making jam with local fruits	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Making fruit jellies	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Making marmalade	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Chutneys made with local fruit and vegetables	*Rhodesia Agricultural Journal*
Kemp, Mrs. Pauline	Bottling fruit for shows	*Rhodesia Herald*
Kemp, Mrs. Pauline	Mulberries	Departmental publication
Kemp, Mrs. Pauline	Guavas	Departmental publication
Kemp, Mrs. Pauline	Pompeloes, Tangeloes and Naartjies	Departmental publication
Kemp, Mrs. Pauline	Oranges and lemons	Departmental publication
Kemp, Mrs. Pauline	Tomatoes	Departmental publication

Author	Title	Publication
Kille, T.	A visitor's impression of Dutch agriculture	*Rhodesian Tobacco Journal*
Kille, T.	To grow or not to grow tobacco	*Rhodesian Tobacco Journal*
Kille, T.	Grading burley this season	*Rhodesian Tobacco Journal*
Kille, T.	Early preparations for this year's tobacco crop	*Rhodesian Tobacco Journal*
Klile, T.	Cultural practices that will help produce desirable burley	*Tobacco Forum*
Kille, T.	Some highlights in development of Rhodesia's tobacco industry	*Tobacco Forum*
Kille, T.	Principles and practise of tobacco grading	*Tobacco Forum*
Kille, T. in conjunction with T. C.	A summary of the weather and its effects on the production of last year's tobacco	*Tobacco Forum*
Lightfoot, C. K.	Grass collection charts 3, 4, 5 and 6	*N.R.B.*
Lightfoot, C. J.	Grass field book	*N.R.B.*
Locke, R. F. and Jones, M. E.	Closed season for cotton in middleveld areas	*Rhodesian Farmer*
Maitin, P. E.	Irrigation of deciduous fruits, citrus and grapes	*Modern Farming*
Maitin, P. E.	Study tour of Israel	Departmental and to be serialized in *Rhodesian Farmer*
Maitin, P. E.	Gauging devices	Departmental and *Farmers' Co-op. News*
Maitin, P. E.	Irrigation control for peas	Departmental
Mandisodza, K.	Burley field day	*Kunzwa*
Meikle, G. J.	Tillage methods that make maximum use of rainfall	*Rhodesian Farmers' Journal*
Meikle, G. J.	Land preparation	*Stocks and Crops*
Naude, J. F.	Article on nose-plate weaning	*Rhodesia Herald* Show issue
Oliver, G.	Ploughing between contours	*Rhodesian Tobacco Journal*
Oliver, G.	Farm Machinery Training Centre	National Ploughing Association Handbook
Oliver, G.	Farm machinery	Farmers' Diary 1970
Palmer, C.	Manicaland—the province that is different	*Tobacco Forum*
Papadopoulo, P.	Apicultural Bulletin No. 1 Summer	Departmental
Papadopoulo, P.	Reviewed and amended Eucalyptus Bulletin	Departmental
Papadopoulo, P.	Mating control	*The Bee Line*
Papadopoulo, P.	Equipment	*The Bee Line*
Papadopoulo, P.	Honey	*The Bee Line*
Papadopoulo, P.	Pollination: Apicultural Bulletin No. 2—Autumn	Departmental
Papadopoulo, P.	Bee venom—propolis	*The Bee Line*
Papadopoulo, P.	Rhodesian indigenous trees and shrubs	Departmental
Papadopoulo, P.	Bee Diseases	*The Bee Line*
Papadopoulo, P.	Floor bee-escape	*The Bee Line*
Papadopoulo, P.	Bee diseases II	*The Bee Line*
Papadopoulo, P.	Bee diseases III	*The Bee Line*
Papadopoulo, P.	Rhodesian cultivated trees—shrubs—flowers and crops	Departmental
Papadopoulo, P.	Agricultural Bulletin No. 3—Winter	Departmental
Papadopoulo, P.	A guide to show exhibits	Departmental
Papadopoulo, P.	Insecticides and bye-laws	*The Bee Line*
Papadopoulo, P.	A guide to beekeepers' terms	Departmental
Pilditch, A. G.	Land planes for irrigated lands	*Rhodesia Agricultural Journal*
Pilditch, A. G.	Grid surveys for irrigation layouts	Departmental
Pilditch, A. G. and Robertshaw, J. E.	A free power source for irrigation	*Rhodesian Farmer*
Robertshaw, J. E.	A free source of power	*Rhodesian Farmer*
Robertshaw, J. E.	A service for farmers	*Agriculture in Rhodesia* 1970
Robertshaw, J. E.	Poultry farming	*Kunzwa*
Robertshaw, J. E.	Low-cost scotch cart	*Kunzwa*
Robertshaw, J. E.	Radio scripts (52)	Departmental
Robertson, W. R.	Crop return variation and economics of supplementary irrigation in high rainfall areas, Part II	*Rhodesia Agricultural Journal*
Robertson, W. R.	Tillage conditions following different crops on heavy soil	*Rhodesian Farmer*
Robertson, W. R.	Economic fertilizing of irrigated crops	*Rhodesian Farmer*
Robertson, W. R.	Comparison of costs of handling seed cotton by conventional and bulk handling methods	*Rhodesian Farmer*
Robertson, W. R.	Crop rotations in relation to season length and quality	*Stock and Crops*
Stocks, J.	Nitrogen in perspective	*Tobacco Forum*
Watermeyer, J. M.	Increased yields from supplementary irrigation	*Stock and Crops*
Watermeyer, J. M.	Detailed description of irrigation methods	*Modern Farming*
Watermeyer, J. M.	Planning a farm irrigation scheme	*Modern Farming*
Watermeyer, J. M.	Notes on legislation in Rhodesia	Departmental and *Farmers' Co-op. News*
Watermeyer, J. M.	Soil—Water—Plant relationships	Departmental and *Farmers' Co-op. News*
Williamson, G.	Units of water measurement (non-metric)	*Farmers' Co-op. News*

Radio and television broadcasts

Buchanan, G. F.	Pruning demonstration	2 × 30 minutes RTV
Cormack, J. M.	Soil conservation	8 minutes
du Toit, F. P.	Bulk maize handling and drying	12 minutes
du Toit, F. P.	Safety in bulk maize handling	5 minutes
Jones, M. E.	Preventive maintenance	10 minutes
Jones, M. E.	Inventions	10 minutes
Jones, M. E.	Sprayers	5 minutes
Kille, T.	Tobacco	5 × 5 minutes
Mandisodza, K.	Nhau dze Varimi	52 × 25 minutes—20 hours
Meikle, G. J.	Tillage research	2 × 10 minutes
Oliver, G.	Farm machinery training	6 minutes
Spear, A. J.	Tillage research	8 minutes
Spear, A. J.	Machinery testing and development	8 minutes
Spear, A. J.	Competition ploughing	4 minutes
Tornbohm, R.	Conex in-service training	15 minutes
Tornbohm, R.	Resource education	10 minutes
Tornbohm, R.	Resource education	10 minutes
Watermeyer, J. M.	General irrigation discussion	30 minutes
White-Spunner, D.	Conservation camp at Digglefold	10 minutes

APPENDIX III A

Importations approved by Committee

	"A" Cattle			
Breed	*Bulls*	*Cows*	*Calves*	*Heifers*
Aberdeen Angus	6	4	—	—
Africander	50	445	10	10
Ayrshire	—	10	—	—
Bonsmara	2	—	—	—
Brahman	13	23	—	—
Brown Swiss	2	4	—	—
Charolais	—	23	—	—
Drakensberger	—	25	—	—
Friesland	2	12	—	—
Hereford	8	11	—	—
Jersey	2	—	—	—
Santa Gertrudis	2	12	—	—
Shorthorn	—	2	—	—
Simmentaler	34	467	2	—
South Devon	2	—	—	—
Sussex	2	9	—	—
TOTALS	125	1 047	12	10

"B" Smallstock			
Sheep	*Rams*	*Ewes*	*Lambs*
Corriedale	14	523	—
Dorper	8	54	—
Finnsheep	1	12	—
Hampshire Down	1	31	—
Merino	10	505	—
Suffolk	2	16	8
TOTALS	36	1 141	8

Goats	*Rams*	*Ewes*	*Lambs*
Angora	2	—	—
Tzaneen Milch	—	2	—
TOTALS	2	2	—

Pigs	*Males*	*Females*
Landrace	1	2
Large White	1	2
TOTALS	2	4

APPENDIX IIIB

Exports

	"A" Cattle			
Breed	*Bulls*	*Cows*	*Calves*	*Heifers*
Aberdeen Angus	6	6	—	—
Africander	67	812	118	10
Ayrshire	10	—	—	—
Brahman	136	156	—	—
Brangus	4	47	—	—
Friesland	15	186	1	—
Hereford	34	147	—	—
Santa Gertrudis	5	—	—	—
Shorthorn	1	—	—	—
Sussex	7	17	—	—
Tuli	20	33	—	—
TOTALS	305	1 404	119	10

APPENDIX IVA

Training

Courses run at Dombashawa Training Institute

No. of courses	*Trainee/ training days*	*Participants*	
		Conex staff	*Others*
53	4 327	400	698

APPENDIX IVB

Training

Courses organized at District and Provincial venues

Province	*No. of courses*	*Attendance*
Mashonaland North	24	581
Mashonaland South	17	219
Manicaland	58	1 274
Midlands	9	205
Matabeleland	1	39
Victoria	9	115

APPENDIX V

Soil conservation

Province	Contour ridges and storm drains			Waterways pegged (miles)	Roads pegged (miles)
	Miles		Acres protected (estimated)		
	Pegged	Constructed (estimated)			
Mashonaland North	4 643·6	4 215·9	77 294	124·4	73·7
Mashonaland South	1 269·9	1 220·7	26 672	73·5	17·4
Matabeleland	336·2	204·9	6 097	5·0	24
Midlands	293·53	259·43	4 249	39·16	37·10
Victoria	329·1	242·1	4 591	20·50	—
Manicaland	887·6	763·8	10 477	40·6	19·9
TOTALS	7 759·93	6 906·83	129 300	303·16	171·10

APPENDIX VI

Water conservation

1st October, 1969 to 30th September, 1970

Province	Number of dams and weirs constructed	Capacity in gallons (million)	
		Total	Average
Mashonaland North	85	315·4	3·7
Mashonaland South	23	531·7	23·1
Matabeleland	37	329	9·14
Midlands	44	349·93	7·95
Victoria	2	1·75	0·875
Manicaland	92	178·3	9·7
TOTALS	283	1 706·08	6·3

APPENDIX VII

Dams constructed

Province	Farmers and contractors				Government units	
	Earth dams		Weirs		Earth dams	
	Number	Percentage	Number	Percentage	Number	Percentage
Mashonaland North	24	20·2	17	20·0	44	51·8
Mashonaland South	16	69·5	3	13·1	4	17·4
Matabeleland	21	56•8	9	24·3	7	18·9
Midlands	14	32	1	2	29	66
Victoria	2	—	—	—	—	—
Manicaland	86	97	4	100	2	3
TOTALS	163	57·6	34	12	86	30·4

Field trials conducted by the Department during 1969/1970

Type	Manicaland	Mashonaland North	Mashonaland South	Matabeleland	Midlands	Victoria	Total
Maize variety	1	—	—	—	—	1	2
Soyabean variety	1	—	—	1	—	—	2
Cotton variety	—	1	1	—	—	—	2
Cotton fertilizer/spacing	1	—	—	1	—	—	2
Sorghum variety	—	2	—	—	1	1	4
Sorghum silage	—	—	—	—	—	—	—
Wheat variety	2	—	—	—	—	—	2
Sulphur and maize	1	—	—	—	—	—	1
Zinc and maize	3	—	—	—	—	—	3
Tobacco irrigation	1	—	—	—	—	—	1
Grass yields	—	—	3	—	—	—	3
Other	—	3	—	—	—	—	3
TOTALS	10	6	4	2	1	2	25

Table 1.—Record of general extension work: Purchase areas

Province	Mashonaland North	Mashonaland South	Matabeleland	Midlands	Victoria	Manicaland	Total
Number of master farmers	693	1 045	106	910	1 389	919	—
Number of master farmers qualifying during year	5	52	1	—	—	14	72
Number of master farmers in training	127	158	28	24	105	147	589
Number of co-operative farmers	899	1 071	703	870	1 531	1 148	6 222
Number of farm carts in use	1 708	1 330	579	1 160	1 732	1 107	7 616
Number of farmers using fertilizer	1 277	982	92	506	725	595	4 177
Number of farmers' days	161	44	35	293	153	306	992
Number of farmers attending field days	11 379	4 390	725	3 752	6 381	3 035	29 662
Number of agricultural shows	4	5	—	2	1	10	22
Number of training centres in use	17	15	1	—	8	16	57
Number of training centres constructed during year	—	—	—	—	—	—	—
Number of tractors	221	144	25	39	45	68	542

Table 2.—Animal husbandry extension—Purchase areas

Province	Supplementary feeding		Pen feeding									Number of farmers marketing through C.S.C./Colcom			Number of farmers dosing	
	Number making hay	Number making silage	Cattle in pens to be marketed	Cattle already marketed—grades obtained												
				Ch. 1	Ch. 2	Ch. 3	G.A.Q.	F.A.Q.	compound	Inferior	Con-demned	Total all grades	C.*	S.*	P.*	C.*	S.*
Manicaland . . .	121	3	603	11	34	62	386	(1)	(1)	(1)	(1)	493 (2)	376	71	110	433	200
Mashonaland North .	14	6	522	2	9	8	122	(1)	(1)	(1)	(1)	141 (2)	306	—	8	49	9
Mashonaland South .	53	12	604	10	7	52	358	(1)	(1)	(1)	(1)	427 (2)	365	1	18	403	113
Matabeleland . .	14	2	51	1	8	7	22	(1)	(1)	(1)	(1)	89 (2)	82	9	10	41	57
Midlands	170	23	118	—	1	22	105	(1)	(1)	(1)	(1)	128 (2)	441	3	6	672	410
Victoria	188	1	845	1	38	9	506	(1)	(1)	(1)	(1)	554 (2)	796	10	33	858	531
Sub totals . . .	—	—	2,743	25	97	160	1 499	(1)	(1)	(1)	(1)	1 832	—	—	—	—	—
TOTALS . . .	560	47	Total of cattle in pens + already marketed = 4 575										2 366	94	185	2 456	1 320

(1) These grades not reported. (2) Top four grades total only.

* C = cattle
S = sheep
P = pigs

Meetings attended by Conex staff

Head Office staff

1. N.R.B. Resource Education Committee (C.T.O.).
2. N.R.B. General Purpose Committee (A.D.F.).
3. N.R.B. Wild Life Conservation Committee (A.D.T.).
4. N.R.B. Meetings (Director).
5. N.R.B. Mineral Resources Committee (A.D.T.).
6. Y.F.C. Council (S.Y.E.O.).
7. Y.F.C. Executive Meeting (S.Y.E.O.).
8. Gwebi College Council (Director/A.D.T.).
9. Chibero Agricultural College Council (A.D.F.).
10. Agricultural Assistance Board (A.D.T./C.P.O.).
11. Central Committee F.I.F. (A.D.T./A.D.F.).
12. Freedom from Hunger Campaign National Committee (A.D.F.).
13. Publicity Committee (A.D.T.).
14. African Farmers' Liaison Committee with Ministry (Director/A.D.F.).
15. Rhodesia Agricultural Journal (A.D.T.).
16. Rhodesian Oil Seed Producers Association (A.D.T.).
17. Hydrological Co-ordinating Committee.
18. Rhodesian Cotton Growers Council (A.D.T.).
19. Pasture Seeds and Horticultural Crops Committee.
20. RNFU Farm Management Committee.
21. Standing Committee on Farm Mechanization (A.D.T./C.E.).
22. Ministry Show Committee (A.D.T.).
23. Field Experiment Committee.
24. Livestock Improvement Committee (Director—Chairman).
25. S.A.R.C.C.U.S. (Director).
26. Mashona Cattle Society.
27. Tuli Cattle Society.
28. Tobacco Research Board (Director/A.D.T.).
29. Tobacco Marketing Board.
30. Tobacco Seed Association Executive Committee.
31. Tobacco Seed Association Technical Committee.
32. The Burley Tobacco Growers' Association.
33. Oriental Tobacco Advisory Committee.
34. Land Settlement Sub-division Committee (C.P.O.).
35. Water and Land Development Sub-committee of Sabi-Limpopo Authority.
36. Irrigation Co-ordinating Committee (C.I.O.).
37. Standards Association of Central Africa—various working committees.
38. Ploughing Association of Rhodesia.
39. Soil Balance Committee of the University College of Rhodesia.
40. Crop Forecasting Committee of Controlled Products.
41. Fertilizer Advisory Committee.
42. Water Reservations Committee.
43. Soil Survey Liaison Committee.
44. Executive Committee of Irrigation Association of Rhodesia (in unofficial capacity).
45. Cotton Liaison Committee.
46. Lowveld Liaison Committee.
47. Rhodesia Seed Potato Association.
48. Crop Variety Committee.
49. Soya Competition Judges Committee.
50. Rhodesian Registered Cattle Breeders' Council.
51. Beef Recording Planning Committee.
52. Africander Cattle Club.
53. Sheep Planning Committee.
54. Wiltiper Breed Society.
55. Library Committee.
56. Standing Committee on Agricultural Engineering.
57. Tillage Research Committee of World Ploughing Organization.
58. Grain Research Liaison Committee.
59. Committee on Co-ordination of Cloud Seeding Experiment (A.D.T.).
60. Government Civil Engineering Advisory Committee (C.E.).
61. Government Liaison Committee with the Civil Engineering Industry (C.E.).
62. Agricultural Technical Services Functional Committee of Metrication Council (C.E. and S.A.E.).
63. Ministry of Agriculture Irrigation Development Committee.
64. Irrigation Association of Rhodesia Executive Committee.
65. Standing Committee on Re-use of Waste Waters.
66. Standards Association Committee on Water Pollution.
67. National Committee of International Commission on Irrigation and Drainage.
68. Aflatoxin Research Team.
69. Standards Association of Rhodesia—Stockfeed Subcommittee.
70. Drought Relief Technical Committee.
71. Quelea Control Committee.

Provincial and District staff

Numerous meetings are also attended by Provincial and District staff, and the following list indicates some of the more important:

1. Provincial and District Conferences.
2. I.C.A. Group and Committee meetings.
3. Farm Irrigation Fund Committees.
4. Drought Relief Committees.
5. Conservation Education Committees.
6. Irrigation Co-ordinating Committee.
7. Research Station Liaison Committee.
8. Agricultural and Show Society Meetings.
9. R.N.F.U. Branch Meetings (by invitation).
10. Ploughing Association of Rhodesia, Branch Meetings.

Analysis of hour utilization by European staff

Province	Victoria		Mashonaland North		Mashonaland South		Midlands		Matabeleland		Manicaland		Grand total	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%		
I.C.A. group farmers	1 278		2 410		2 128		1 029		1 564		1 698		10 107	
Staff conferences	1 021	16·10	995	17·50	954	18·00	684	14·00	462	12·75	934	16·00	5 050	16·00
Courses	1 362		3 705		2 939		1 272		1 282		1 516		12 076	
Inspections	626	2·75	1 514	3·70	2 052	6·00	1 084	5·00	1 295	5·00	1 099	4·50	7 580	4·5
Agronomy	1 113		2 093		2 481		1 413		637		1 876		9 613	
Tobacco	26		1 103		499		—		—		926		2 554	
Livestock	1 521		1 715		2 308		1 892		1 570		1 485		10 491	
Soil/water conservation	1 058	44·53	8 489	45·70	5 100	48·00	1 832	52·00	2 061	41·25	4 130	50·50	22 670	47·00
Irrigation	2 039		866		2 176		1 579		1 775		2 237		10 672	
Farm planning	1 366		1 946		714		1,341		2 272		728		8 367	
Veld management	2 438		1 484		1 956		2 555		1 718		1 079		11 230	
Farm management	565		843		980		1 181		636		522		4 727	
Field days, shows	750		1 588		1 543		550		818		833		6 082	
Field trials	422		465		278		73		535		664		2,437	
Census	603	15·12	480	13·30	182	11·50	235	12·00	436	10·20	214	15·00	2 150	12·15
General extension liaison	1 663		2 864		1 903		1 784		861		2 140		11 215	
Administration	4 903		6 754		4 971		3 568		7 636		3 463		31 295	
Publications	2	91·50	1 292	19·80	582	16·50	147	17·00	335	30·80	182	14·00	2 547	19·75
TOTALS	22 763	100	40 606	100	33 746	100	22 219	100	25 893	100	25 726	100	170 953	

Approximate acreages of irrigated crops 1969–70

(*Note*.—These figures are approximate only and will be replaced by more accurate data from Central Statistical Office in due course)

Crop	Acreage irrigated						
	Matabeleland	Mashonaland North	Mashonaland South	Manicaland	Midlands	Victoria	Total
Maize	6 987	2,750	6 820	1 820	5 274	2 900	26 551
Cotton	860	8 828	3 380	1 855	728	12 433	28 084
Groundnuts	91	115	190	250	80	550	1 276
Tobacco	—	211	2 010	610	20	15	2 866
Soya beans	—	895	930	250	278	926	3 279
Other summer crops	143	1 075	100	185	230	4 126 (4)	5 859
Wheat	888	5 415	3 165	1,447	1 990	24 030	36 935
Barley	401	—	—	50	—	1 500	1 951
Potatoes	356	520	1 028	420	256	78	2 658
Other winter crops	1 179 (1)	111	1 735	1 133 (2)	58	595 (4)	4 811
Lucerne	1 070	349	956	535	476	104	3 490
Citrus	713	4 455	814	502	180	115	6 779
Deciduous fruits	116	177	400	1 600	2	101	2 396
Vines	—	58	443	175	2	3	681
Pastures	319	1 290	535	200	2	622	2 968
Other perennials	70	125	40	3 642 (3)	12	280	4 169
TOTALS	13 193	26 374	22 546	14 674	9 588	48 378	134 753

(1) Vegetables. (2) Mainly peas. (3) 2 837 acres tea and 800 acres coffee. (4) Rice 3 926 acres. (5) Seed beans 425 acres.

Veld management

A.—Systems presently operating and planned by the Department of Conservation and Extension during 1969–70

Grazing system	Number of farms operating system		Total acreage involved	
	New plans	Total for year	New plans	Total
Split season system	32	86	494 816	997 341
Short duration grazing programme	325	688	914 331	3 577 160
TOTALS	357	744	1 409 147	4 574 501

Systems planned to 30th September 1970, compared with acreage in country

Number of farms planned	Planned acreage	Acreage in country	Percentage planned
1 193	8 455 033	40 706 000	20·8

B.—Potential for expansion—new application not yet planned

Type of plan applied for	Number of farm	Acreage involved
Split season system	77	746 060
Short duration grazing	375	1 056 685
TOTALS	452	1 796 745

C.—Farmer courses and field days

	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Number of courses/field days	21	25	19	23	32	25	145
Number of persons attending	635	785	373	574	752	1 597	4 716

Annual Report of the Director of Veterinary Services

for the year ended 30th September, 1970

General

As is not unusual in Rhodesia the rainfall played havoc with agriculture in many parts of the country particularly in the southern districts. Excellent rains fell in the months October to December and prospects of record crops seemed assured. Thereafter the only showers of any consequence in most districts fell in February. Beitbridge and Liebig's Ranch for instance had 12·13 inches and 10·4 inches respectively up to the end of December, no rain in January, 3·5 inches in February and no falls whatsoever in March, April and May, and finally an unseasonal further inch in June.

Crops planted early in the northern areas gave reasonable returns but yields in general were poor necessitating Government drought relief assistance once again.

Disease summary

The country remained exceptionally free of serious disease outbreaks. Foot and mouth disease was confirmed on Kazangula Ranch on 27th January, 1970. This property lies on the extreme western tip of Rhodesia in the angle formed by the Botswana Border and the Zambezi River. Infection was an extension from the Zambian side of the river where it had been reported to us on the 17th of that month. The outbreak was successfully confined to the 302 cattle and seven goats on that property, and the outbreak officially terminated at the end of March.

Likewise a small incursion of African Swine Fever was detected in Mpimbila Tribal Trust Land, which again is on the Botswana Border some fifty miles west of Plumtree. This is an arid sparsely populated sector. Mortality was limited to 72 pigs. Fifteen possible contact pigs were destroyed and compensation of $163 paid to the African owners.

The rabies position deteriorated slightly with 52 confirmed cases as against 32 in the previous year. This was primarily due to a recurrence of the disease in jackals (10 cases) and 10 confirmations in cattle, as against a nil return for both species in 1969. The incidence in bovines always increases sharply when jackals are involved. Dogs vaccinated against rabies reached a new record of 363 129 compared to the previous highest totals of 310 155 in 1969, and 310 463 in 1968.

There was also a serious rise in cattle deaths from Theileriosis (*Th. lawrencei*)—426 this year compared to 36 and 254 respectively in the two previous years. New Theileriosis Regulations were gazetted and other steps taken to combat the disease.

Good progress was made against our largest veterinary problem the tsetse fly menace. This pest has been virtually eliminated from the south-east corner of Rhodesia, with the generous aid and assistance of our friends in the Republic of South Africa and Moçambique. In this area alone some 2 000 square miles of country have been reclaimed from the fly since 1964, and marked progress on several other sectors of the northern and eastern tsetse fronts can be recorded.

Control of other diseases was satisfactorily maintained. This together with the comparative absence of poverty deaths this year, is reflected in the massive all round increase in numbers of domestic stock:

Increase in number of cattle — 430 480
Increase in number of sheep — 147 881
Increase in number of goats — 450 850
Increase in number of pigs — 37 545

Staff

Professional officers

Our establishment of Veterinary Officers was increased from 40 to 46 posts with effect from 1st July, 1968. The staff position at the end of the year (30th September, 1970) was as follows:

	1964	1965	1966	1967	1968	1969	1970
Establishment . . .	40	40	40	40	46	46	46
Fixed Establishment .	18	26	23	27	32	34	35
Provisional Transfer .	7	5	4	2	1	—	—
Temporary Appointments	4	3	6	4	2	3	3
Vacant Posts . . .	11	6	7	7	11	9	8

It will be evident that the anticipated improvement did not take place, because the recruitment of four new veterinary officers was offset by the resignation of two very good men and the termination of the temporary appointment of a third. We were particularly sorry to lose Dr. K. J. Kuhne, the Officer in Charge of the Bulawayo Veterinary Investigation Unit, who had eight years service in the Department. He was the third specialist officer to be recruited from us by the same South African firm.

We appreciate that Government cannot match salaries that are paid to specialized personnel by private enterprise, but it is imperative that Government recognize the need to keep our salaries competitive with those offered by the South African Service. We cannot maintain the efficiency of the Department if we are unable to attract and retain first class officers. All vacancies in the Field Service will be filled in the next few months by some of the nine Rhodesians who are due to graduate at the end of 1970. The recruitment of three Laboratory Specialists needed (virologist, bacteriologist and parasitologist) will largely depend on the result of the forthcoming salary review.

Animal Health Inspectors

Authorized establishment was increased by five posts and now totals 114. Prospects for staff in this sector were slightly improved by the regrading of six posts to Senior A.H.I. The turn-over during the year was, however, still excessive with 15 resignations, one lateral transfer, one retirement and a death.

Once again it is a pleasure to mention the excellent contribution made by these officers to routine disease control. They work long hours, often under very, very trying conditions of heat, dust or rain to fulfil their scheduled programmes.

Training of animal health inspectors

This section continues to make excellent progress under the able tuition of the Training Officer, Mr. H. S. de Bruijn and his assistant, Mr. H. B. Bezuidenhout. Their efforts were recognized by the Public Services Board in authorizing a Senior A.H.I. post as Assistant Training Officer. The enthusiasm and experience of these two officers have ensured that trainees are given a very sound practical knowledge of their duties. All recruits are given an intensive induction course of two weeks prior to being posted to District Offices for practical experience. Thereafter, they and other inspectors are recalled for further instruction. Ten five-day courses and three eleven-day courses were given in addition to instruction at local level. Of the 16 candidates who sat the A.H.I. examination, 13 passed, of whom one obtained a distinction rating and four secured merit grades.

Demands for instruction from the Ministry of Internal Affairs continue to snow-ball and have included two one-day courses for 23 field assistants, 42 one-day courses for African dip attendants and courses for 32 extension assistants. As the effectiveness of the dipping services for African-owned cattle frequently bears a close relationship to the interest and supervision displayed by the District Commissioner and his staff, arrangements are in hand, at the request of the Ministry of Internal Affairs to meet all District Commissioners in their Provinces in the immediate future.

Meat Inspectors

The meat inspection staff now comprises three full-time veterinary officers, 25 qualified meat inspectors and two technicians who undertake this service at the five abattoirs owned by the Cold Storage Commission, Colcom pig factory and Liebig's abattoir at West Nicholson. Owing to the 28 per cent. increase in cattle slaughtered during 1970 and appreciable rise in sheep, goat and pig slaughterings, an additional whole-time veterinary officer will be added to this establishment in January, 1971, and authority to appoint four more meat inspectors has been requested.

During the year two meat inspectors resigned, one retired and one was recruited. To ensure future staff requirements a third course for 12 trainees will commence in January for the Certificate in Meat Inspection granted by the Royal Sanitary Institute of Health.

High praise is due to all meat inspection staff for maintaining the exacting standard required, under severe strain. Ten and twelve hour working days have not been exceptional to cope with the record kill of all species.

Tsetse Control Branch

During the year a glossinologist, an immunologist and a further clerical officer were appointed, which has improved the staff position. The

establishment was increased by one glossinologist and two tsetse field officer posts to cope with the increased tsetse control operations in the Mount Darwin area, and by one tsetse field officer to assist the research glossinologist at Sengwa. The Mapping Section was strengthened by the addition of a further mapping assistant post. The appointment of a handyman has greatly assisted the essential maintenance of our spraying equipment.

Four glossinologist posts were regraded as Regional Glossinologist to accord with the responsibilities and nature of the work undertaken by the incumbents.

Veterinary Research Branch

This Branch still has vacancies for experienced specialist personnel, notably a virologist, a bacteriologist and a parasitologist. Such officers are not readily recruited since they can command salaries above our existing grades. To meet this difficulty the Department encourages existing staff to undertake post-graduate studies. Three officers are at present on such courses and a fourth had to cancel his acceptance because of illness. Unfortunately, four officers who were given this facility subsequently resigned for more lucrative posts elsewhere.

Training of laboratory technologists continues at this Branch. It is noteworthy that in a recent open competition the projects of three of these trainees secured the first three places.

Office accommodation and housing

New office accommodation for our Head Office is scheduled for completion in November of this year, and will be more in keeping with the dignity and value of the Department than present premises. Ten thousand dollars was obtained to accommodate a small virology extension to the Veterinary Research Laboratory and this is due for completion in 1971. A major improvement was the commissioning of the Bulawayo Veterinary Investigation Unit. This is a most presentable modern laboratory, in the charge of a Senior Veterinary Research Officer and a technician, which will obviate the past unsatisfactory procedure of sending all specimens to the central laboratory in Salisbury. Conversion of an existing stable to small-animal house and feed room to serve this unit was admirably carried out by the Ministry of Works. Similarly, minor alterations to Umtali Provincial Office, by enclosing a verandah and providing better post-mortem facilities have been of great benefit. A new office was provided for the A.H.I. at Umvukwes and a better one for the officer stationed at Umvuma. The new Government office block scheduled for Gatooma did not materialize due to tender difficulties.

We were fortunate to acquire four of the nine houses built for Government at Gatooma. Good accommodation in such a hot centre goes a long way towards keeping staff and their families satisfied.

Our most pressing needs under this heading are new offices to accommodate our Tsetse Control Branch and further diagnostic facilities at the Central Laboratory.

Livestock

In spite of record cattle slaughter figures at C.S.C. abattoirs, cattle numbers showed the phenomenal increase of 430 480 head as against 296 059 in 1969, and 337 233 in 1968. This brings our cattle census to a record holding of 5 208 229 head. The sharp increase is partly due to a comparative absence of poverty deaths this year. It will be remembered that the increase figure for 1969 was prejudiced by the death of 124 000 head in a bitterly cold spell early in that year. Although the past season was disastrous in many areas from the cropping aspect, the good rains in the lowveld in the early part of the season ensured a good growth of grass. Cattle do better in a dry year provided drinking water is adequate.

There were no serious outbreaks of epidemic disease and no interference at all in the marketing of livestock. Nutrition continues to be a most important factor retarding even greater expansion of the industry. It is to be hoped that the increased interest in veld management, particularly the high density short-interval grazing system will allow more stock to be kept without further deterioration of the veld. Although the standard of management has improved appreciably in recent years, it is in this sector that more progress must be made. Necessary prophylactic inoculations, intelligent use of anthelmintics and efficient dipping frequently do not receive the attention that ensures a high level of management.

Beef cattle

Beef production continues to be the most stable and encouraging farming enterprise. Prices paid for ranch bulls have fallen and are now more realistic because of a greater number available from new breeders. Afrikanders appear to be recovering some of their popularity at the expense of the Brahman breed, and fancy prices are being paid for Charolais and Simenthalers, but Herefords and Sussex are pretty firmly entrenched as the preferred bulls for cross-breeding.

The quality of slaughter animals now reaching Cold Storage Commission abattoirs is excellent and improves annually, thanks mainly to the European producers who own 47·5 per cent. (2 478 643 head) of the national herd, and account for 75 per cent. of the beef marketed.

Dairy cattle

The dairy industry's problem is over-production —the larger the percentage of dairy products which has to be used for manufacturing purposes the more adversely is the price affected. This in turn leads to increased production to reduce the cost of milk per gallon.

Good progress was made with the compulsory tuberculin testing of dairy herds, whose owners had declined to avail themselves of the voluntary testing scheme introduced initially in the early nineteen fifties. Three hundred and sixty-six herds comprising 23 046 head were tested and revealed 50 reactors of which 31 were in one herd. Only six herds showed any infection.

Sheep

Sheep in the country now number 840 000, of which 60 per cent are African-owned. Two-thirds of the increase of 148 000 head in 1970 are also in the ownership of Africans. Their flocks are predominantly the fat-tailed indigenous type, which thrive in arid areas on a minimum of sustenance. European-owned flocks are mostly Black-Headed Persians or this breed crossed with Dorpers. Some very good pedigree flocks of Dorper, German Merino, Wiltiper and Corriedale breeds are kept, but, too frequently, others are a neglected side line. Because of the preference Africans have for beef and poultry, and the lower price of these meats, the demand for mutton is relatively limited to the European consumer. The potential market at present prices is nearing saturation point.

Goats

Now numbering 1 654 000—an increase of 450 000 in this last year—goats are almost becoming a pest. At many dipping centres in the lowveld they now outnumber the cattle, and, being able to survive on a lower level of nutrition, they continue to aggravate an already desperate grazing position. Efforts by the Ministry of Internal Affairs to find an economical system of marketing these animals have increased the numbers slaughtered at major abattoirs to 21 983—an increase of 79·7 per cent. over the previous year.

Pigs

Here again pig census figures have increased by 37 545 head giving a current total of 223 542 pigs. To minimize marketing problems, Colcom Factory are introducing a contract system with effect from January 1971. Contracts will be based on previous production.

This species continues to enjoy freedom from epidemic type diseases. Cysticercosis (Pork Measles) in African-owned pigs, transit deaths and tail-biting in the case of European-owned pigs are the main problems. Both latter conditions are showing a lower incidence following useful recommendations by Dr. George Stewart— Veterinary Adviser to the Pig Industry Board. We continue to afford him all laboratory facilities required, and his efforts in the field of pig management are raising the standard of husbandry generally.

Poultry

The foundation stock of large producers is of exceptional quality and in great demand by adjacent territories. The industry is geared for rapid expansion and would rocket if trade restrictions were removed. Producers have adapted themselves well to present circumstances, but, as in most developed countries, production is increasingly getting into the hands of large concerns.

High quality dressed chickens at 25 cents per pound are a regular feature on most tables, and eggs at a similar price per dozen are not unusual. There is a resurgence in turkey and duck production.

Chinchillas

Chinchilla breeding is a struggling industry in the hands of inexperienced people and beset with marketing and management problems. Enteric conditions continue to be the most significant diseases.

Border control

Lundi–Limpopo game fence

This 110-mile game fence of ten strands of high strain steel wire on 7½ foot hard wood poles was erected in 1962, and has had a most significant effect on the incidence of foot and mouth disease outbreaks in that corner of Rhodesia. It is well maintained and continuously patrolled by resident guards. Two cattle were driven through a ravine under the fence, but were immediately detected and confiscated. Twenty head were driven across the Limpopo after being stolen in the Transvaal. These were impounded, the proceeds paid to the owner, and the four culprits sent to prison. This fence was supplemented by a parallel cattle fence from the Limpopo to the Nuanetsi River thereby ensuring a stock-free corridor along this sector, where the greatest danger of contact existed.

Provided game fences do not exclude elephants and buffalo from reasonable access to water, the animals quickly adapt themselves to the presence of the wire and thereafter do very little damage. This is well illustrated by the mass of elephants (hundreds) that are contained by the Lundi–Limpopo Game Fence without damaging it, and yet they are devastating vast areas of mopane woodland nearby. On the other hand a sector of the Wankie game fence was extensively destroyed in a few days when water in the Makarikari and Dzivanini pans dried up, and elephants had to cross the fence to reach other sources of water.

Wankie game fence

This 170 mile fence which runs along the eastern and north-eastern boundary of Wankie National Park separates the game and cattle areas. It is presently being extended by some twenty miles, which extension will be visible for some seven miles along the main Bulawayo–Victoria Falls road just north of Dahlia. In this sector, and in all future construction metal standards, (9 ft. by ½ in. plough beam) will be used in place of hard wood poles. This will greatly reduce future maintenance costs.

Kazangula game fence

This 110-mile fence stretches down the Botswana border to Panda-ma-Tenga, and across to the Lobangwe River. It breaks contact between our stock and game from Botswana and prevents to and fro movement of game between Wankie Park and the Matetsi area.

Cattle fences

The numerous strategic foot and mouth cattle fences in the lowveld were well maintained. The wire in the Botswana Border fence from Plumtree to the game fence is rusted and requires replacement. This is a project scheduled for 1971.

Quarantine camps

A new quarantine camp was established at Beitbridge. This camp will cater for cattle coming from the north bank of the Limpopo and is necessary because of the ever present threat of foot and mouth disease from the Kruger National Park and the adjacent part of Moçambique. South Africa intends incorporating the Pafuri Game Reserve into the Kruger National Park, thereby bringing it that much nearer to our border.

Southwill quarantine camp was relinquished for a smaller but adequate one on Gorge Grange. Similarly arrangements are in hand to exchange the Nuanetsi River Stock Reserve for a better sited centre at Mbizi Siding, on the Bannockburn–Lourenço Marques railway line.

Tick life and dipping

The sombre state in respect of tick control persists, but, at least, there are indications that our fulminations are beginning to be heard. The sharp increase in deaths from Theileriosis (*Th. lawrencei*) —426 this year as against 290 over the combined period of 1968 and 1969—was brought to the notice of the Rhodesia National Farmers' Union, who have given their support to the more stringent control measures we have taken. Similarly the Ministry of Internal Affairs is actively co-operating in the first essential element, which is to convince District Commissioners and their staff concerned that efficient tick control is necessary, and that it will be enforced. Discussions at Provincial Offices have been held with all District and Provincial Commissioners, and no less than 46 courses have been given throughout the country to field assistants and dip attendants belonging to that Ministry.

Each course includes a practical session at a dip tank where the various points can be demonstrated and rammed home. We believe there is also an appreciation in that Ministry of the urgency of increasing dip fees to put the service on an economical basis, so as to obviate the present annual subsidy of $340 000 from the African Development Fund. If the cattle owners are asked to pay realistic fees, they will want value for their money, and this in turn should lead to better water supplies and better facilities. Because of repercussions we have not pressed the matter in recent years, but that time is over.

Quarantine orders for tick infestation rose from 1 670 to 2 065, of which 971 were served on European stock owners—a record that reflects little credit to their claim to leadership in agriculture.

Previously, when arsenic was the standard dipping preparation, it took no less than five immersions at five day intervals to cleanse a herd of cattle infested with blue ticks (Boophilids). This is because arsenic does not readily kill this tick at certain stages of development. Now, however, it takes only one dipping in, for instance, a phosphatic dip, to cleanse the cattle. The practical significance of this fact is that dipping is now often neglected, or is less frequent than is necessary to control other species less obvious than the blue tick—notably the brown tick (*R. appendiculatus*). Our staff have accordingly had instructions to pay particular attention to properties where brown ticks occur.

Quarantine orders for tick infestation

	European-owned properties	*African areas*	*Total*
1969–70	971	1 094	2 065
1968–69	687	983	1 670
1967–68	855	898	1 753
1966–67	857	804	1 661

Contraventions

	Prosecutions (persons)	*Total fines* $
Cattle Cleansing Regulations	1 677	10 170
Movement of Cattle Regulations	55	521
Rabies Regulations	471	4 243
Foot and Mouth Regulations	Nil	—
Trypanosomiasis Regulations	100	940
Stock Register Regulations	69	244
Import Regulations	Nil	—
Animal Health Act	361	2 526
Cruelty to Animals Act	17	140
Total 1969–70	2 750	18 784
1968–69	1 785	11 295

It will be noted that almost two-thirds of the 2 750 prosecutions were for infringements of the Cattle Cleansing Regulations.

Cattle inspected

District	*European*	*African*	*Total*
Salisbury	1 911 910	1 949 923	3 861 833
Bulawayo	1 165 560	3 738 455	4 904 015
Umtali	472 933	1 641 806	2 114 739
Gwelo	848 445	1 698 717	2 547 162
Victoria	2 530 450	3 519 675	6 050 125
Sinoia	785 924	321 916	1 107 840
Gwanda	915 493	1 830 350	2 745 843
Chipinga	230 114	630 464	860 578
Total	8 860 829	15 331 306	24 192 135
1968–69	7 648 809	14 059 940	21 708 749

Cattle sales

European-owned cattle

The number of auction sales held increased from 480 to 529 in 1970. Prices of slaughter and male stock were maintained but there was less demand for female weaners. Two hundred and twenty-three thousand, three hundred and eighty-six head were sold as against 220 342 the previous year.

African-owned cattle

Six hundred and sixty-two weight and grade sales were held by the Ministry of Internal Affairs, at which 94 762 head were sold. This is an increase of almost 10 000 cattle over the previous year and represents 3·47 per cent. of the 2 729 586 African-owned herd. Admittedly this sales figure does not take account of animals delivered direct to C.S.C. abattoirs, under section 6 permits, but as such sales totalled only 3 510 last year they do not significantly affect the percentage off-take.

Comparative numbers of cattle sold at Ministry of Internal Affairs weight and grade sales, expressed as percentages of the total in that area are:

District	*Total African cattle*	*Sold*	69–70	68–69	67–68	66–67	65–66
Salisbury	547 482	7 144	1·32	1·725	1·85	1·63	1·05
Bulawayo	531 140	22 807	4·25	3·534	3·45	3·83	6·82
Umtali	355 013	7 392	2·08	1·602	1·42	1·67	0·77
Gwelo	444 736	11 844	2·66	1·659	1·81	1·75	1·87
Victoria	513 687	21 935	4·27	5·189	4·71	2·49	5·36
Sinoia	85 140	640	·75	0·660	0·84	0·19	0·05
Gwanda	189 374	18 167	9·59	8·923	8·561	8·32	12·71
Chipinga	63 014	4 833	7·66	9·342	7·19	3·16	4·80
Total	2 729 586	94 762	3·47	3·566	3·174	2·88	4·42
1968–69	2 552 691	84 943					

This resistance of the African to selling a reasonable percentage of his cattle is really depressing when one reflects on the position prior to 1961, when District Commissioners enforced culling of old scrub stock, to hold the stocking rate of a T.T.L. within an assessed maximum.

Specified diseases

Viral diseases

Foot and mouth disease

Following a report that foot and mouth disease had spread from the Western Province of Zambia to an area on the north bank of the Zambezi River in that country, we decided to vaccinate all domestic stock on our side of the river with SAT II inactivated vaccine. Vaccinations were commenced on the 26th January, 1970, but when the vaccination team reached the last and most westerly property (Kazangula Ranch) on the 27th, the disease was found to be already present.

Kazangula Ranch lies in the angle between the Botswana Border and the Zambezi River. The border in this sector has a game fence, which protected Botswana from any extension of infection. Confining the disease to the 302 head of cattle and seven goats on the ranch was a simple affair. All stock in the Matetsi area were revaccinated with type II vaccine before the cordon of guards was removed at the end of March 1970.

Total vaccinations amounted to 12 913 cattle, 1 871 sheep and goats, 143 pigs and two tame eland.

Foot and mouth disease was reported in the Limpopo area in Moçambique in March. Accordingly all sheep and goats, numbering 1 927, and 118 cattle which live along that strip of the border were vaccinated with foot and mouth vaccine. Vaccinations were repeated two months later. No infection crossed into Rhodesia.

The annual revaccination (fifth successive year) of the 45 236 cattle on Liebig's Ranch was carried out in April.

Apart from the above mentioned small outbreak on Kazangula Ranch, there has been no active infection in Rhodesia since August, 1967, and that outbreak was also confined to one property (Hippo Valley Estate).

Rabies

The rabies position deteriorated slightly in that 52 cases were confirmed as against 32 last year. This was due to the unfortunate recrudescence in jackals (ten cases). The usual increase in bovine incidence when jackals are involved was also noted. By using the fluorescent antibody technique results are usually available in 1½–2½ hours of the brain being received at the Laboratory. This test gives a 95 per cent. accuracy. Results are subsequently confirmed either histologically or biologically or by both methods where there is doubt or human involvement.

Positive cases according to species

Dogs	20	Cat	1
Jackals	10	Leopard	1
Cattle	10	Domestic pig	1
Mongoose	7	Human	2
	TOTAL 52		

In view of the considerable challenge from the above rabid wild animals, the immunity in the dog population can be considered as very good. Thirteen of the above twenty cases were in dogs along our borders, and having no ear-tattoos, were possibly from the other side.

The table below indicates the strenuous efforts put into vaccinating a record 363 129 dogs. Previous maxima were in 1968 (310 463) and 1969 (310 155).

Rabies vaccinations

District	*European*	*African*	*Police dogs and cats*	*Total*	*Brain specimens*	*Positives*
Salisbury Prov.	8 620	65 208	111	73 939	88	1
Bulawayo Prov.	5 006	57 312	3	62 321	75	26
Umtali Prov.	2 032	39 025	—	41 057	68	16
Gwelo Prov.	2 460	83 654	—	86 114	24	2
Victoria Prov.	1 451	61 212	—	62 663	24	5
Sinoia Dist.	1 054	7 967	—	9 021	7	—
Gwanda Dist.	251	14 164	—	14 415	7	—
Chipinga Dist.	546	13 053	—	13 599	11	2
	21 420	341 595	114	363 129	304	52
1968–69	33 108	276 980	67	310 155	—	32

Total dogs vaccinated since 6.9.50: 3 269 109
Total positive cases since 6.9.50: 1 560

Contagious epididymitis and vaginitis

The typical testicular abnormality associated with this condition is now rarely seen. Three ranches where sporadic cases occur, however, remain in quarantine.

Lumpy skin

Mild cases occur sporadically in most provinces. There has been no evidence of the severe Neethling strain for several years.

African swine fever

A small intrusion of this disease was detected in Mpimbila Tribal Trust Land on the Botswana border on the 26th January, 1970. This is a hilly, sparsely populated area with little contact between African settlements. Mortality was limited to 72 pigs. Fifteen possible contact pigs were slaughtered and compensation of $163 paid to the owners. There has been no recrudescence since that date. The previous outbreak in Rhodesia was on our north-eastern border in August, 1967. That outbreak, although also localized, involved the slaughter of 771 African-owned pigs.

Rift Valley Fever

During the wet season infection was diagnosed on 18 properties, all of which were in Mashonaland except for one farm in Victoria and one in Umtali Provinces. A somewhat disturbing feature was the reappearance of this disease on at least two properties where all stock had been vaccinated the previous year. To what extent the position was complicated with Wesselsbron virus it is impossible to estimate because of the similarity of these two infective organisms. The poor antigenic response to Rift Valley fever vaccination was however confirmed from serum samples. No cases of this disease have been diagnosed since May of this year.

Mucosal disease

Cases of the Mucosal complex have appeared sporadically in the past—mostly in Matabeleland, but this year serious infection occurred in weaners on a Marandellas farm. The position was investigated and confirmed by a virologist from Onderstepoort. Cases have also appeared on farms in the Umtali and Cashel areas.

Bacterial diseases

Anthrax: An ox died from anthrax on a farm in the Darwin District, and two African picannins contracted infection at a kraal in the Kana area. In accordance with our normal policy all domestic stock on farms infected within the last three years were compulsorily vaccinated by Departmental staff: cattle 4 733; donkeys 672; sheep 331; and goats 5 844—total 11 580 vaccinations.

Tuberculosis:

Imports tested 635
Exports tested 1 560

Dairy cattle

Good progress was made with the compulsory testing of dairy herds whose owners did not avail themselves of the voluntary testing scheme introduced in the early nineteen fifties. The following table summarizes these tests:

District	*Herds*	*Total Cattle*	*I/R's*	*Reactors*	*Passed*
Salisbury Province	150	10 877	40	7	10 830
Bulawayo Province	28	3 295	7	1	3 287
Umtali Province	21	1 084	9	2	1 073
Gwelo Province	27	3 240	21	31	3 189
Victoria Province	56	2 396	21	4	2 371
Sinoia District	14	706	8	5	693
Gwanda District	55	—	—	—	55
Chipinga District	15	1 448	21	—	1 427
	366	23 046	127	50	22 925
1968–69	79	8 525	67	2	8 456

Of the 50 reactors, 31 were in one herd, and only six herds showed infection on post-mortem of reactors.

Ranch cattle

Testing of cattle on Liebig's Ranch was resumed last year after a break of six years due to a temporary deficiency of professional staff. This year's test revealed 101 reactors in the 29 826 head tested. Visible lesions were found in the carcases of 27 head on slaughter. A pleasing feature this year was the comparative absence of advanced disease.

Meat inspection incidence

Abattoir	*Percentage of carcases infected* 1969–70	1968–69	1967–68	1966–67	1965–66	1964–65
Salisbury	Nil	0·0009	0·0028	0·0090	Nil	0·0063
Bulawayo	0·0041	0·0082	0·0015	0·0009	0·0060	0·0083
Victoria	0·0005	0·0002	0·0005	0·0060	0·0055	0·0320
Umtali	0·0012	Nil	Nil	Nil	Nil	Nil

Of the 53 carcases found infected at Bulawayo abattoir, 47 were reactors to tuberculin tests.

Brucellosis: The following blood samples were tested:

Laboratory Salisbury	21 259 samples	1 409 positive	896 indefinite
Laboratory Bulawayo	6 851 samples	357 positive	158 indefinite
	28 110	1 766 (6·28%)	1 054 (3·75%)

Eradication is as yet beyond our means. Control by vaccination with strains S.19 and 45/20 is

encouraged. The department sold 197 313 doses of S.19 vaccine. The alternative product is obtainable from commercial sources.

Vibriosis: The significance of vibriosis in our infertility problem is unknown. The condition would appear to be pretty well ubiquitous, but of little import.

Newcastle Disease: After many years of freedom from Newcastle disease, a dangerous outbreak occurred in September, 1968. Stringent control methods including slaughter of all birds on infected properties promptly restored the position. There has been no active infection since October of that year. Commercial establishments have, however, continued to vaccinate their breeding flocks with inactivated vaccine—the only type permitted and sold by the Department.

Bacillary white diarrhoea: 112 801 fowls were tested on 87 properties. The 24 reactors were negative on culture. This disease has not been confirmed for many years.

Fowl typhoid: Sporadic outbreaks occur—mostly in African-owned fowls.

Fowl cholera: 18 outbreaks were diagnosed. Four hundred and seven birds were slaughtered involving $285 in compensation.

Quarter evil: Confirmed deaths 380; deaths reported 695.

Johne's disease: Nil.

Enterotoxaemia: 152 deaths on 27 properties. Prophylactic vaccines are used extensively.

Tick-borne diseases:

	Deaths 1970	*Deaths* 1969
Theileriosis (Th. lawrencei)	426	36
Redwater	355	306
Gallsickness	487	577
Heartwater	167	67

Mineral and chemical poisonings: 583 head.

Plant poisonings: 241 head.

Blood smears examined:

Trypanosomiasis	13 586
Anaplasmosis	334
Redwater	215
Theileriosis	183
Quarter Evil	59
Spirochaetosis	3
Anthrax	1
Heartwater	18
Miscellaneous	186
Negative	110 674
	125 259

Post mortem examinations—Field staff

	Bovine	*Ovine*	*Porcine*	*Poultry*	*Miscellaneous*	*Total*	*Faeces*
Salisbury	395	273	70	8	47	793	565
Bulawayo	223	107	107	2 401	300	3 138	239
Umtali	92	66	13	45	11	227	671
Gwelo	238	123	22	73	14	470	414
Victoria	40	30	19	1	3	93	236
Sinoia	94	52	13	27	8	194	190
Gwanda	11	3	7	6	5	32	16
Chipinga	41	12	—	18	—	71	319
	1 134	666	251	2 579	388	5 018	2 650
1968–69	898	802	198	1 035	254	3 187	3 457

Trypanosomiasis: As always the part played by the Veterinary field staff in the areas where trypanosomiasis occurs was the unspectacular but not unimportant routine administration of drugs to infected livestock together with the taking and examination of blood films in order that the efficiency of control measures may be continuously assessed and new incursions recognized.

In the north-west of the country a new focus of disease was uncovered during June some eight miles to the south of the Victoria Falls and just east of the main north road, 27 cases had been diagnosed up to the end of September. The origin of the infection which is some 70 miles to the west of the nearest known front in Rhodesia has not so far been established. In the east of the N.W. Front i.e., in Wankie West and Binga Tribal Trust Lands, there was little alteration.

Little change was apparent in the Gokwe–Gatooma area until the turn of the year, since when there has been improvement in some areas. In the Mbumbusi, Lutope and Central areas the cases have been reduced by the insecticide spraying. The trypanosomiasis risk remains high in the Umniati, Copper Queen and N.E. zones.

The position in the Central Zambezi Front west of the Angwa River is satisfactory with a reduced incidence in all areas.

The Northern Front, from the Angwa East drainage through Doma–Mangula, Sipolilo, Mazarabani and Chimanda to the Mazoe has shown greatly increased activity in both African and European areas. The peak infection was, (probably due to the early cessation of rainy weather) early during 1970 and a fall off in the number of cases was apparent in some areas from April. In Chimanda the deterioration continued and 953 cases were diagnosed, despite the wide scale and regular application of curative drugs.

South of the Mazoe in Mtoko, Inyanga, Umtali and Makoni the position was satisfactory and anti-tsetse measures may be described as most successful.

In Chipinga the new agricultural year saw a reduction of infection, but from April, incursions took place in the Central Sabi lowveld area. A focus of infection in the Sabi–Tengwe confluence area was again evident from cases on both banks of the river in the Musiquavanhu Tribal Trust Land and on Humani and Devuli Ranches in Chiredzi district. The Sangwe Tribal Trust Land remained clear of trypanosomiasis.

In the Nuanetsi Tribal Trust Land nagana was confined to the test herds south of the Lundi River and close to the Moçambique border. This confirms the spectacular success of the residual insecticide campaign which is now being waged mainly in Moçambique.

Cattle exposed to infection		440 000
Blood films examined		164 768
Infection	*T. congolense*	5 421
	T. vivax	1 207
	T. brucei	4
	Mixed	85
		6 717

Treatment (cattle)

Iso-metamidium	50 323
Berenil	46 601
Ethidium	1 616
	98 540

In addition 14 910 treatments with *iso-metamidium* were given to donkeys in the Gokwe area.

Summary of tsetse control

The full report of the Assistant Director of Veterinary Services (Tsetse and Trypanosomiasis Control) is available as a separate issue.

Area reports

Tsetse and trypanosomiasis control operations have continued without interruption throughout the year. The total number of cattle trypanosomiasis cases has increased from 5 207 in 1968–1969 to 6 717 this year. This increase may, to some extent, be attributed to the somewhat disappointing results of the 1969 insecticide spraying operation experienced in some areas, particularly in parts of the Gokwe–Sanyati area of operations, where tsetse control operations are being conducted under the most difficult of conditions, that is, in the presence of pastoral activities, with cattle, donkeys and small stock in large numbers. Towards the close of the operations, during late September and October which are usually very hot and dry heavy local showers of rain occurred which were followed by a rapid flushing of the vegetation and the general dispersal of the tsetse fly away from the treated refuge sites. It is also probable that the heavy showers washed off some of the insecticide deposit. In other areas, however, including much of the Gokwe–Sanyati area, the results of the control operations have been encouraging. A further contributory factor for the increase has been the removal of prophylactic treatment at some of the cattle centres, in order to provide an indication of the effect of the spraying operations. The 1970 spraying operation covered 3 502 square miles within Rhodesia, using 166½ tons of 75 per cent. DDT wettable powder at an average rate of 1·80 ounces of para para DDT per acre. In addition, in co-operation with teams from South Africa and Moçambique, 925 square miles of tsetse infested territory were treated within Moçambique, making the total area treated 4 427 square miles.

In the Binga District, where the cattle at some centres are maintained on isometamidium, the incidence of trypanosomiasis although persistent, is kept within bounds. No cases had occurred in the Wankie District for 27 months until June, 1970, when in the western part of the Wankie Tribal Trust Land two cases of bovine trypanosomiasis were reported from Katchechete Dip. Further investigations revealed a focus of infection in the cattle centres associated with the Lukunguni river. The focus is apparently quite isolated. Tsetse surveys are in progress to determine the source of the infections. It is possible that carriage of fly by aircraft may be a factor. The tsetse situation in the Lupane District is satisfactory, and very few cases of trypanosomiasis occur.

Bovine trypanosomiasis persists at a high level in the Gokwe District, producing, on average, 270 cases per month. There has been an improvement at the centres associated with the Umniati River, which can be related to the success of the hunting and spraying operations carried out during 1968 and 1969 in the Chenjiri Purchase Area between the Umniati and Umfuli rivers.

The tsetse and trypanosomiasis position in Urungwe District continues to improve. However, it is with deep regret that we report the death of Mr. W. G. Bitmead, Tsetse Field Officer, from trypanosomiasis contracted whilst on duty in the Gache Gache area on the shores of Lake Kariba.

There has been an increase in cases in the north Lomagundi and Sipolilo Districts which have warranted treating the tsetse habitats in these areas this year with insecticide. In the south of the Lomagundi district, trypanosomiasis has not been recorded since October, 1968, after the successful 1968 spraying operations.

In the Mount Darwin District bovine trypanosomiasis has increased in importance, particularly in Chimanda Tribal Trust Land. Intensive tsetse surveys carried out in this region of the international border within Masoso Tribal Trust Land revealed concentrations of *G. morsitans*. These have been identified, access tracks have been cut and a small scale insecticide spraying operation has been carried out to arrest further spread of the fly. The area will be delimited by a game fence running eastwards from the Ruia river along a road which is now being cut along the international border. Several successful boreholes have been sunk in preparation for full scale tsetse control operations.

In the Mtoko and Inyanga districts trypanosomiasis now occurs only at a low level.

The only cases which have occurred on European farms in the Chipinga district were recorded from Craigmore Farm, associated with the Umsiliswe river, where 15 cases were recorded, but after the 1969 spraying none has occurred since March, 1970. Withdrawing our slashing and burning operations from the Border Clearing farms has not been followed by the reappearance of trypanosomiasis. Spraying operations during 1970 have been designed to eliminate tsetse from the Umsiliswe area, and from the Sabi East cattle centres surrounding Mwangazi.

A small focus of infection has reappeared on Humani Ranch, due probably to the presence of *G. pallidipes*. It is undoubtedly related to the persistent *T. vivax* infections at Chibuwe on the east bank of the Sabi river.

Further successes have attended the international tsetse control operations in the Sabi–Lundi–Limpopo basin. The comparative treatment with Dieldrin emulsion and DDT wettable powder were equally very successful. DDT is now the insecticide of choice throughout our operations. Operations in Rhodesia in this sector, covered only 80 square miles, adjacent to the international border, where small pockets of *G. morsitans* persisted. In Moçambique, the operations covered an area of 925 square miles, and extended into Moçambique for 50 miles from the border. An area of some 1 800 square miles of Rhodesian south eastern lowveld has now been cleared of *G. morsitans* since 1964. It is anticipated that the 1970 operations will finally clear tsetse from this region of the country.

Tsetse research

The studies of tsetse and warthog relations are continuing at Sengwa Research Station in conjunction with the Research Station of the Department of National Parks and Wild Life Management. The numbers, composition and physiological state of the *G. morsitans* population within a four square mile area has been recorded over a period of two and a half years. Warthogs have accounted of about two thirds of the food of the tsetses. The area has been made impassable to warthogs by means of a continuous wire netting fence, and the resident warthogs have been captured, tranquilized and liberated well away from the capture area, (most have been liberated at Kyle Game Park). About 90 warthogs were removed from the area. Changes in the dynamics and physiological status of the tsetse population are being recorded.

Investigations into tsetse population sampling techniques have revealed that captures made by using sticky screens and electrified surfaces produce more reasonable samples of the tsetse population than obtained by conventional capture from man by means of a hand net. More tsetse flies are caught and a far higher percentage of females is obtained. These investigations will lead to a better understanding of female tsetse behaviour.

At Rekomitjie Station in the Zambesi valley, observations are being made on the relative attractiveness of cattle, sheep and goats under similar natural conditions, to wild tsetse populations. These observations will lead to a better understanding of the part played by sheep and goats in supporting low populations of tsetse flies in settled areas. In addition, a few species of

wild animals have been trained to tolerate observers who record the numbers and nature of tsetse flies that come to feed on them as they stand in various ecological situations. The part played by various game species in sustaining populations of tsetse flies may thus be explained.

On an island in Kariba a dwindling population of *G. morsitans* has been revived, in the absence of its favourite host, the warthog, by the introduction of cattle as an alternate host. The physical and numerical changes in the flies are recorded.

Veterinary Research Branch

Diagnostic and advisory services continued at a high level as indicated by the following figures:

Post-mortem examinations

Cattle	43
Sheep	78
Pigs	82
Chinchilla	101
Rabbits	186
Poultry	4 030
Miscellaneous	42

Foetal samples

Bovine—261; Ovine—16.

Miscellaneous

Rabies brain specimens	304
Blood samples	21 259
Tampons (Vibrio Foetus)	2 497
Milk samples	1 196
Faecal samples	917
C.S.C. specimens	528
Colcom specimens	553
Miscellaneous including histological, haematological and biochemical	6 653
	33 907

Vaccine sales

Comparative figures of vaccines sold	1970	1969	1968
Anthrax	64 600	62 400	117 300
Bluetongue	82 850	97 450	56 500
Brucella Rev. I	1 750	1 750	1 700
Calf Paratyphoid	8 348	10 946	10 186
Contagious Abortion	197 313	180 359	197 308
Enterotoxaemia	109 450	155 050	132 950
Fowl Pox	492 100	421 200	388 200
Fowl Typhoid	20 300	21 200	20 100
Gallsickness	17 820	11 895	17 960
Red Water/Gallsickness	15 035	13 161	14 136
Horsesickness	8 249	7 084	5 866
Lumpy skin	1 970	Nil	1 980
Quarter Evil	200 453	471 365	703 390
Quarter Evil/M. oedema	Nil	1 580	43 090
Quarter Evil ex Onderstepoort	800	30 300	Nil
Lamsiekte/Botulism	75 300	59 050	71 150
Lamb Dysentery	Nil	300	450
Newcastle Disease	394 485	1 377 258	109 400
Tetanus	1 300	200	200
Heartwater	46	16	32
Rift Valley Fever	706 300	1 193 300	Nil
Pasteurella	31 100	Nil	Nil

Sales of Quarter Evil vaccine were down following a decision to cease Departmental production of this item. Similarly sales of Newcastle disease and Rift Valley Fever vaccines declined because the first-mentioned condition was eliminated in October, 1968, and the Rift Valley outbreak passed its zenith.

Wild life research

The outbreak of foot and mouth disease, in such a remote and sparsely stocked property as Kazangula Ranch, afforded our Wild Life Research Officer an opportunity of infecting several species of game with this disease. The following animals were securely penned and inoculated with natural SAT II type virus:

Buffalo	5
Wildebeeste	4
Kudu	4
Impala	5
Warthog	5
Wild Pig	2
Duiker	1
Elephant	1
Cattle	4

Results of serum titres at varying periods of post infection have not yet been completed. From the visible lesions produced and subsequent probang samples it would appear that certain species of game react more positively and continue to harbour virus in their throats for longer periods than others.

Schistosomiasis

Clinical outbreaks were not evident this year. A Research Officer has been granted special leave to study this problem and plans to submit his findings as a thesis for a Ph.D. degree at the University College of Rhodesia.

Meat inspection

The new Cold Storage Commission abattoir at Gatooma is due to be officially opened on the 4th of November. This factory, which is the most modern in Africa, is expected to reach full production of 500 head of cattle per day within the next few months.

The ever increasing service provided by the Meat Hygiene Laboratories has now become an integral and essential part of meat production in Rhodesia. Particular stress is placed on bacteriological standards, and over 25 000 samples were handled during the year.

No attempt will be made to produce an exhaustive list of the many improvements which have been effected during the year in all export works. It is with much appreciation, however, that we can acknowledge the co-operation of the Cold Storage Commission and Colcom in effecting better methods and improved facilities for turning out a healthy, clean and wholesome product.

The expected increase in cattle slaughter figures materialized dramatically this year, being 28·3 per cent. up on last year's total. Further increases are confidently predicted in all classes of stock for the coming year.

Sheep and goat statistics continue their upward trend and the current interest in goat slaughtering is likely to keep this graph moving sharply upwards, particularly in West Nicholson, where the total units killed and inspected has quadrupled in the past year.

Pig slaughterings were headed for a phenomenal total until Colcom's introduction of a contract system which curtailed kills particularly from African hawkers in Bulawayo.

Percentage condemnation of carcases

	Cattle % of kill	*Sheep % of kill*	*Goats % of kill*	*Pigs % of kill*
Salisbury . .	0·39	0·18	0·13	0·63
Bulawayo . .	0·45	0·29	0·59	2·84
Victoria . . .	0·62	0·65	0·64	0·94
Umtali . . .	0·56	1·75	0·0	0·28
W. Nicholson .	—	0·0	2·30	4·03
Total . .	0·46	0·37	1·45	1·25
1968–69 . . .	0·53	0·21	0·68	1·45

The overall condemnation rate for cattle has shown a further decrease of 0·07 per cent., and at less than 0·5 per cent. must be one of the lowest rates in the world. Pig condemnations have dropped by 0·2 per cent., the vast majority being for measles. Both sheep and goat condemnations show considerable increases.

Observations

Cattle

The continued decrease in cattle condemnations may be accounted for in several ways, and the following possibilities come to mind. The progressively younger age at slaughter of our beef cattle, the fact that we receive a minimum of old dairy animals, and the increasing use of laboratory aids in diagnosis (which results in a higher proportion of doubtful cases being passed than previously).

Under nutrition, represented by emaciation with oedema and bull oedema together, remains at a satisfactorily low figure; particularly in view of the drought.

Sheep and goats

The marked increase in pathological emaciation can be attributed to the past season's drought, particularly in Matabeleland.

Seventy-one cases of poor bleeding occurred when emergency slaughter had to be carried out on a consignment of goats.

Pigs

Apart from the inevitable measles, the main cause for condemnations is still pyaemia due to tail biting, particularly in Salisbury. Septicaemic conditions also show an increase.

Important conditions

Beef measles (*C. bovis*)

Centre	*Condemned* %	*Detained* %	*Total* %	1968–69 %
Salisbury . .	0·093	1·16	1·25	0·74
Bulawayo . .	0·22	1·52	1·74	2·27
Victoria . . .	0·11	1·01	1·11	1·20
Umtali . . .	0·073	1·003	1·08	1·26
Total . .	0·14	1·25	1·39	1·39

The overall incidence of measles has remained unchanged, but the proportion of heavily infes ed carcases has decreased in relation to the total; 1968–69, 12 per cent. of infested carcases were condemned, while in the current year, condemnations dropped to 10 per cent. This figure is expected to decrease still further with new legislation now in force which is somewhat more lenient with regard to outright condemnations for measles. The new regulation also permits of greatly reduced detention times for freezing measly carcases and offals where sophisticated blast freezing facilities exist, and this has stimulated interest in the salvage of offals at C.S.C. centres where all such offals were previously condemned.

Liver Fluke infestation (*F. gigantica*)

Centre	Condemned %	Trimmed %	Infestation %	1968–69 %
Salisbury	30·38	18·22	48·60	53·3
Bulawayo	11·15	5·08	16·24	15·7
Victoria	16·58	1·99	18·56	18·0
Umtali	20·19	4·89	25·09	19·7
Total	20·57	9·99	30·55	31·4

There is a welcome drop of one per cent. in the incidence of liver fluke this year, which one would like to attribute to our efforts to convince producers of the seriousness of this problem. The fact remains that the total weight of liver lost through fluke alone is equal to the weight of whole carcases condemned for all reasons.

Trials have been instituted on a Matabeleland ranch to compare efficacy of various flukicides and to find out whether fluke infestation reduces slaughter weight. Results will be to hand in approximately two years.

Tuberculosis

Centre	Localized	Generalized	Total
Salisbury	0	0	0
Bulawayo	41	12	53
Victoria	—	4	4
Umtali	1	—	1
Total	42	16	58
1968–69	62	20	82

Of the above cases, 47 were tuberculin reactors from two properties.

Traumatism condemnations

Centre	Carcases	Quarters	Limbs	Tails	Trimmings lb.
Salisbury	28	224	234	302	26 271
Bulawayo	14	19	215	225	1 309
Victoria	16	42	42	454	19 649
Umtali	3	2	0	11	756
Total	61	287	491	992	47 985
1968–69	61	197	373	1 461	45 790

With the exception of quarters, which have doubled in number, the overall figures show a somewhat better trend, although the total weight lost is in the neighbourhood of 60 tons. As a fraction of the beef produced during the year, the figure is commendable in a country where cattle travel long distances to the abattoir.

Liver tapeworm (*Stilesia hepatica*)

Centre	Sheep and goats incidence %	Cattle incidence %
Salisbury	95·9	0·17
Bulawayo	89·6	0·54
Victoria	76·7	0·51
Umtali	73·4	0·24
W. Nicholson	81·9	—
Total	89·0	0·37
1968–69	90·2	0·49

Pork measles (*C. cellulosae*)

Centre	Incidence %	1968–69 incidence %
Salisbury	0·19	0·14
Bulawayo	2·55	3·32
Victoria	0·74	0·63
Umtali	0·04	0·0
W. Nicholson	4·03	1·92
Total	0·87	1·08

The overall incidence has shown a further drop this year while the percentage sty-raised pigs has remained approximately the same, although it is probable that a greater proportion of African-owned pigs slaughtered in Bulawayo were intensively raised.

Ownership group proportions are as follows:

Centre	European percentage of total %	African and butchers percentage of total %
Salisbury	83·8	16·2
Bulawayo	35·2	64·8
Victoria	74·6	25·4
Umtali	70·0	30·0
W. Nicholson	0·0	100·0
Total	69·3	30·7
1968–69	69·4	30·6

Milk spot livers in pigs (*Ascaris suum*)

Centre	Percentage incidence %	1968–69 incidence %
Salisbury	10·7	11·6
Bulawayo	5·3	6·2
Victoria	13·7	14·5
Umtali	17·1	17·2
W. Nicholson	3·3	—
Total	9·5	10·4
1968–69	10·4	

These figures show a drop of about one per cent. with the lowest incidence in the west of the country.

Tuberculosis and mycobacterial lymphadenitis in pigs

Bulawayo and Victoria were the only two centres where cases of tuberculosis-like lesions were found. In Bulawayo, three cases were generalized, and 11 confined to submaxillary nodes, in Victoria, three cases occurred in heads only.

Animals dead on arrival

Centre	*Cattle*	*Sheep and goats*	*Pigs*
Salisbury	12	4	114
Bulawayo	20	8	24
Victoria	2	—	1
Umtali	—	—	1
Total	34	12	140
1968–69	22	26	120

The cattle percentage is extremely low considering the long journeys by mechanical transport, which are travelled by some animals. The pig percentage has fallen but is still excessive—mostly due to heat-stroke.

Game carcase inspections

The Mazunga centre was the only one where regular inspections were made, with Wankie and Chiredzi/Nuanetsi remaining inactive for most of the year. Matetsi has apparently been abandoned, and the Intundhla operation is the only producer of consequence in Northern Matabeleland.

Returns are as follows:

Centre	*Total inspected*
Mazunga	2 605
Intundhla	24
Nuanetsi/Chiredzi	136
Total	2 765

Predominant species examined were: Impala 1 747; Steenbuck 284; Kudu 282; Wildebeest 201; Duiker 88; Eland 76. Other species cropped included zebra, buffalo, sable, warthog, waterbuck, reedbuck, bushbuck and hippo.

Meat Hygiene Laboratories

Salmonella swabs and samples

(*a*) Composite samples from the abattoir:

Source	*Total samples*	*Positive*	*Percentage positive*
Bile box	26	4	15·4
Anderson expeller	26	5	19·2
Casings washer	26	9	34·6
Tripe tub	26	8	30·8
Ab. effluent	51	14	27·5
Sewers	49	24	49·0
Gall Bladders	1 055	0	0·0
Clean offal	25	4	16·0
Rough offal	24	7	29·2
Pig. mes. nodes	1 228	14	1·1
Total	2 536	89	5·5

Details of serotypes isolated:

S. senftenberg — 5 Ss. Mim, bechuana, (chingola),
S. enteritidis — 4 collendal, montevideo, adeoyo,
S. typhimurium — 2 (muenchen) (karroo)—once each.

Untyped 70. *Note.*—The serotypes in brackets represent the most likely alternative within groups where accurate typing was not possible.

The recent acquisition of a full set of antisera should result in a higher proportion of typed strains in the future.

(*b*) **Packed meat and carcase sampling:**

Routine sampling of boneless beef from random boxes, packs of offals and carcases at the scale has been instituted. Samples are transported regularly from Victoria C.S.C. to Bulawayo, in the form of swabs in selenite F enrichment broth. Routine incubation and subculture then proceeds as for Bulawayo samples. The extra 24 hours in selenite at room temperature appears to enhance the selectivity of this medium and very few spoilage organisms are seen on subsequent cultures. Results are as follows:

Centre	*Product*	*Total swabs*	*Positive swabs*	*% positive*
Fort Victoria	Boneless beef	12 435	4	0·03
Bulawayo	Boneless beef	4 245	4	0·09
Bulawayo	Tongues	3 210	12	0·37
Bulawayo	Packed casings	25	6	24·00
Bulawayo	Carcases	125	4	3·20
	Total	20 040	30	0·15

The above figures represent a fairly satisfactory state of affairs with regard to salmonella contamination. Infection certainly exists in our slaughter animals as the results under (*a*) above clearly demonstrate. The very low incidence in the boneless meat indicates that the handling of carcases and meat in C.S.C. factories is of a high hygienic standard. Whilst the occurrence of four positive carcases out of 124 is disturbing, it must be borne in mind that the neck, shank and brisket are selected as swabbing sites, where the opportunity for localized contamination is greatest.

Census of stock

Census of cattle—Appendix A, small stock—Appendix B.

Acknowledgements

I would like to acknowledge, with thanks, the assistance gladly given to the Department by many sectors, particularly the Ministry of Internal Affairs, the Police, the Department of National Parks and Wild Life Management and the Rhodesia Cattle Producers' Association.

To my own staff I express my sincere appreciation of their conscientious devotion to duty and helpful attitude.

J. M. WILLIAMSON,

Director of Veterinary Services.

APPENDIX A

Census of Cattle, 1969–70

District	*European owned cattle*	*African owned cattle*	*Total cattle*
Salisbury	761 804	547 482	1 309 286
Bulawayo	449 430	531 140	980 570
Umtali	139 178	355 013	494 191
Gwelo	406 075	444 736	850 811
Victoria	308 466	513 687	822 153
Sinoia	256 071	85 140	341 211
Gwanda	93 664	189 374	283 038
Chipinga	63 955	63 014	126 969
	2 478 643	2 729 586	5 208 229
1968–69	2 225 058	2 552 691	4 777 749
Difference	+253 585	+176 895	+430 480

APPENDIX B

Small stock census

	Pigs			Sheep			Goats			Equines		
	Eur.	Afr.	Total	Eur.	Afr.	Total	Eur.	Afr.	Total	Eur.	Afr.	Total
Salisbury	55 274	30 313	85 587	132 853	28 618	161 471	10 090	93 260	103 350	2 521	5 347	7 868
Bulawayo	10 633	29 479	40 112	56 638	132 728	189 366	9 250	585 716	594 966	2 278	29 479	31 757
Umtali	5 818	8 028	13 846	25 929	69 274	95 203	2 584	165 923	168 507	535	2 021	2 556
Gwelo	6 747	19 419	26 166	54 005	49 206	103 211	5 672	205 564	211 236	1 176	22 311	23 487
Victoria	5 025	21 148	26 173	28 921	119 385	148 306	4 251	312 205	316 456	823	13 433	14 256
Sinoia	6 941	16 634	23 575	47 028	9 873	56 901	3 897	24 941	28 838	722	2 549	3 271
Gwanda	1 214	4 226	5 440	6 362	58 946	65 308	2 828	183 717	186 545	264	17 705	17 969
Chipinga	941	1 702	2 643	8 392	11 516	19 908	554	43 951	44 505	350	4 583	4 933
	92 593	130 949	223 542	360 128	479 546	839 674	39 126	1 615 277	1 654 403	8 669	97 428	106 097
1968–69	73 961	112 036	185 997	317 193	374 600	691 793	46 690	1 156 863	1 203 553	10 789	113 310	124 099
Difference	18 632	18 913	37 545	42 935	104 946	147 881	−7 564	458 414	450 850	−2 120	−15 882	18 002